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AIR FORCE HUMAN RESOURCES LABORATORY

FIELD EVALUATION SYSTEM FOR AIR FORCE TECHNICAL TRAINING: ANALYSIS AND MODIFICATION

By

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AIR FORCE SYSTEMS COMMAND
BROOKS AIR FORCE BASE, TEXAS 78235

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This report has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

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In the present study an analysis was performed of the Air Training Command's (ATC) field evaluation program. Data obtained from this program are used to provide feedback to the instructional system regarding how well graduates of resident courses perform in the field subsequent to graduation. Shortcomings in the present system were identified through extensive and comprehensive group interview methods. New methods of data collection and analysis were devised to increase the usability of the information gathered by ATC evaluation divisions. These methods were demonstrated in a routine evaluation of the Aircraft Electrical Systems Specialist Course, an apprentice level course taught at Chanute AFB. The demonstration was judged to be successful, and the report illustrates alternative methods of tabulating and interpreting data. It was recommended that these results be reviewed by ATC officials prior to system-wide modifications.

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SUMMARY

The present study set out to perform an analysis of the field evaluation system used to obtain data to provide feedback to the instructional system regarding how well graduates of resident courses were performing as apprentice level specialists on their first duty assignment following completion of the resident course. This was accomplished through a series of consultations and visits with personnel at the technical training centers and at Headquarters Air Training Command. A list of field generated system weaknesses were delineated from these visits. Further discussions among the project staff, the Air Force Human Resources Laboratory monitor, and personnel from Headquarters, Air Training Command focussed on feasible alternatives to pursue.

The project staff developed survey instruments which included a basic supervisor questionnaire, a basic graduate questionnaire, three supplemental supervisor questionnaires, and a set of diagnostic task follow-up sheets. These questionnaires were administered through the Training Evaluation Division, 3350th Technical Training Wing, to a sample of 186 graduates of five classes of Course 3ABR 42330 and to their supervisors. With one exception, the questionnaires were returned from the field to the Training Evaluation Division and were then forwarded to the project staff for processing. After the project staff conducted a series of analyses designed to provide a more in-depth examination than is usually accomplished, the completed field data forms were returned by the project staff to the Training Evaluation Division.

The relationship of ability measures to various criteria were presented both in terms of correlation coefficients and in tabular format. Results indicate that manipulation of ability levels would not improve the situation revealed by the field survey. Reactions of both graduates and supervisors indicate that the survey forms and procedures were well understood and provided valid data.

Job cluster analyses revealed some cluster differences although they tended to be relatively small. Some tasks, however, were associated mainly with specific clusters. Overall, the specialty used in the study is relatively homogeneous as Air Force specialties go, so the application of these analyses to other specialties may reveal dramatically different results.

Reports of overall difficulties on the job or with OJT by graduates and supervisors did not always agree. Most disagreements were in the direction of the graduate perceiving a difficulty but the supervisor not reporting any difficulty. The usual practice of using only supervisor data may therefore tend to understate the amount of difficulty the graduates actually have.

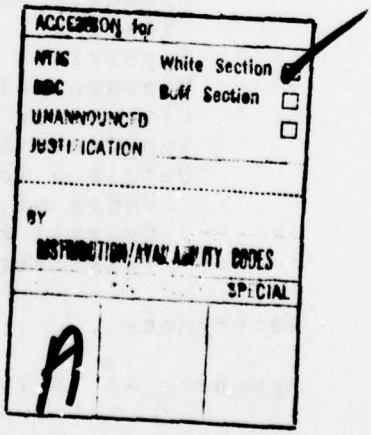
A large number of tasks did not meet the 80% satisfactory guideline but closer examination showed that the standard acceptance limits used by the project staff were higher than those stated by the Specialty Training Standard for some of the tasks. Furthermore, for all tasks between 48% and 84% of the sample had not performed the task. Comparisons between graduate and supervisor reports of tasks performed showed more agreement than disagreement but there were considerable discrepancies. The most frequently cited reason for non-performance was Not Yet But Will Be. These tasks should therefore undoubtedly be retained as training requirements. However, one may tentatively question the strength of the training requirement for those tasks for which there were large numbers of not required responses due to situational characteristics of particular duty assignments.

Supervisor ratings based on own observations, both task specific and general impressions, were somewhat higher than ratings based on information obtained from other personnel at the work site. The measures of overall proficiency provided by the supervisor data were highly correlated with the mean of their individual task ratings, that is, the general overall rating made by the supervisors was much the same as a calculated mean rating based on the individual tasks each graduate had performed.

The supplemental questionnaires provided different but related task importance indices. The relationship between these measures and general criteria of job performance indicated statistically significant relationships in the directions expected. The data base demonstrated an internally consistent statistical structure.

Simple decision table formatting of two dimension comparisons was used to produce gross indices of adequacy and to identify specific tasks in terms of these indices. These data were summarized as an input to personnel at the technical training center for detailed analyses of any task which appeared to be troublesome.

Overall, the procedures and instructions utilized in the present study produced results which members of the project staff feel would be useful to curriculum designers and instructional personnel at the technical training wings. Before any recommendations for system-wide changes are made, however, these results should be submitted to personnel at all of the technical training centers for review and comment on how useful they could be for the courses involved in their own technical training center. This review process should involve personnel from the centers' command staff, the Training Evaluation Division, and curriculum design and instructional units. Only after a systematic field review of the results of this study would recommendations for or implementation of system-wide changes seem warranted.



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FIELD EVALUATION SYSTEM FOR AIR FORCE TECHNICAL TRAINING: ANALYSIS AND MODIFICATION

I. INTRODUCTION

Technical Training in the Air Force is a large operation. The scope of the technical training program includes the conduct of over 1000 different resident courses which turn out over 180,000 graduates annually. The overall technical training program includes virtually all Air Force training other than basic military training, aircrew training, and professional education. Technical training, which is primarily vocational education, is achieved not only through the resident courses mentioned above but also in large part through an organized, dual-channel, on-the-job-training program in which the majority of enlisted personnel are engaged during their first tour in the Air Force. This study was concerned primarily with the resident course portion of the overall training program with particular emphasis on the 3 skill (or apprentice) level courses.

A systematic evaluation system has been in existence for some years. This system was designed to be an integral part of the Instructional System Development (ISD) model which guides the development, administration, and evaluation of all technical training courses. The field evaluation portion of this system, along with internal evaluation by training personnel at the five Air Training Command (ATC) technical training centers, constitutes the evaluation step of the ISD model. The evaluation step is designed to ensure that job performance requirements are being accomplished by technical training graduates and to determine supervisors' and graduates' opinions of the training program. The field evaluation is usually accomplished through the administration of questionnaires to the supervisors of recent course graduates and to the graduates themselves. The primary purpose of these questionnaires is to obtain data on the judged, demonstrated proficiency level of the graduates on a list of relevant job tasks selected from the appropriate Specialty Training Standard (STS) and the judged adequacy of training received on these tasks. The average demonstrated proficiency levels are then compared with those specified in the STS in order to identify potential training deficiencies.

A need was perceived to improve the existing field evaluation system in order to make it more effective for the purpose of providing information on the adequacy of training received by students engaged in technical training courses. It was anticipated that modified questionnaire procedures and more comprehensive analyses than presently carried out, making fuller use of computer technology, would help to improve the system. Any proposed modifications were to take full cognizance of constraints imposed by the amount and type of manpower needed, costs of developing and implementing modifications, and the hardware capabilities of present base level computing systems. Major sequential activities of the study included an analysis of the present system in order to identify perceived inadequacies, development of proposed modifications, and the demonstration of the proposed modifications on one technical training course.

The primary emphasis of the study was methodological rather than substantive. The systems analysis was conducted on an ATC-wide basis to identify problems common to all technical training courses. Instruments and procedures developed for field evaluation modifications were restricted to those which could be applied to most, if not all, technical training courses. While the analyses conducted during the study utilized only data collected from the specific course selected for demonstration purposes, they were designed to be generic in nature and to demonstrate the types of analyses and interpretations that could be made from such data. In other words, we did not set out to do a substantive evaluation of the demonstration course. Rather, we set out to demonstrate the feasibility of collecting certain types of information, making certain generic types of analyses, and pointing out potential ways in which such summarized data could be used in making judgments about training adequacy and possible areas of training deficiency. This report sets forth results of the data collected on the demonstration course and indicates some possible interpretations that could be made. This report does not set forth definitive conclusions about existing training deficiencies nor methods for their remediation. The results of the study were made available to the Training Evaluation Division of the 3350th Technical Training Wing, which has jurisdiction over the demonstration course, for their use in making such determination.

II. PROJECT ACTIVITIES

The present field evaluation of formal technical school graduates is governed by several regulations and manuals. Air Force Regulation 50-38, Field Evaluation of Formal School Graduates, establishes the requirement for a program of evaluation for formal courses. Air Training Command Regulation 52-1, Training Evaluation and Course Reviews, establishes policies, responsibilities, procedures, and guidance for conducting internal course evaluations, reviews, and field evaluations to provide feedback for improvement of instructional systems. Air Training Command Manual 52-334, Graduate Evaluation Questionnaire ATC, establishes policies, responsibilities, and procedures for operating the data automation portion of the graduate evaluation questionnaire system. A review of these basic documents provided the project staff with an overview of the present system and how it was designed to operate. These documents also highlighted the major constraints of the present system. The project staff also reviewed recent articles from the professional literature having to do with student evaluation and relevant measurement techniques.

Following the review of the documentation and literature, the systems analysis progressed with a series of meetings between the project staff and Air Force personnel having responsibility for the development, administration, evaluation, and management of technical training activities. An initial meeting was held with the project monitor and the staff of the Technical Training Division of the Air Force Human Resources Laboratory at Lowry Air Force Base. This meeting served to further orient the project staff and to clarify overall goals and expectations for the study. The project staff also held discussions with the Commander and personnel from the Evaluation Division of the Technical Training Wing located at Lowry which provided greater insights regarding how the existing system operated at this organization level.

A subsequent visit was made to Headquarters, Air Training Command at Randolph Air Force Base for discussions with personnel whose primary responsibilities were for overall management of Air Force training activities in order to meet operational requirements. Discussions were held with personnel from organizational units concerned with program planning, training systems development, technical training standards and evaluation, and data

automation activities. These discussions were helpful in pointing out some of the concerns of these higher organizational level training managers. To some extent these concerns were similar to those of personnel at the training wing level and to some extent they were different, reflecting the differences in basic responsibilities at the two levels. The consensus seemed to be that, while potential modifications to the field evaluation system should in no way degrade its usefulness for training wing personnel, it might be useful to include new or modified elements which more fully met the perceived needs of Headquarters ATC personnel.

While in the San Antonio area, the project staff also held discussions with personnel from the Training and Evaluation Division of the technical training wing, from the Standards Evaluation Division of the Officer Training School, and from the Occupational Measurement Center (OMC), all located at Lackland Air Force Base. The latter organization was included since they routinely collect and analyze data regarding tasks performed by the various specialties throughout the Air Force. These data provide an important input to the development of both quantitative and qualitative training requirements for other units within the Air Training Command. Personnel utilization patterns which indicated job clusters within specialty areas could have an important influence on training requirements and procedures. There seemed to be some feeling that fuller utilization of such clusters in the field evaluation system might provide useful information for training course modification. The OMC was also working with various measures of task importance that had been developed by AFHRL/OR. Since the present field evaluation system is geared mainly to the job task level, indices for weighting the relative importance of the various job tasks could be important in the evaluation process. Task Difficulty is one such measure. Results with this scale appear promising and such data are now apparently being collected routinely by OMC during Occupational Surveys. Consequences of Inadeqaute Performance and Task Delay Tolerance are two additional scales on which some work has been done; however, results are not conclusive. If data collected by the OMC are to be directly used by the technical training wings, there must be a way for translating between the job tasks used in Occupational Surveys and those job tasks specified in the STS, which is the primary document that guides the technical training system. Some of the work has already been done in mapping the direct relationship between job

tasks from the two sources. The preliminary results indicate that the task can be done with an acceptable degree of reliability by senior enlisted subject matter specialists.

Discussions with personnel from the Training Evaluation Division and the Standards Evaluation Division focused on the operation of the present system and its perceived inadequacies, as well as on possible remedial actions. While the primary emphasis for the study was on enlisted training, the officer course was included largely because it was located at the same facility and to obtain some insight into generalizations applicable across the full training spectrum.

The systems analysis continued with a series of meetings at other technical training wings to determine perceived inadequacies of the present system and to obtain preliminary suggestions for possible modifications. The Nominal Group Technique was used for several of these problem definition meetings. A distinguishing characteristics of this technique is that, while it is conducted as a small group activity, each participant is forced to commit himself at various steps along the way before a point is opened up for group discussion. This makes it difficult for one or two dominant participants to control the results of the meeting and makes it possible to derive consensus conclusions based on each individual member's contributions.

Participants in the Nominal Group sessions were first asked to individually write down their answer to the question, What do you think are inadequacies of the present field evaluation system for technical training courses? Each participant was successively asked for one inadequacy, which was put on a flip chart by the project staff member who chaired the meeting. This round robin activity continued until all individually produced inadequacies were displayed on the flip charts. This was followed by a discussion restricted at this point to clarification of the points listed, which sometimes led to a combining of separate items. This produced a list of potential inadequacies, all of which were relatively uniformly understood by all participants. Participants were then asked to individually rate these items in terms of importance. In round robin fashion, these individual ratings were reported to the group and were summarized on a flip chart. A group discussion was then held regarding the summarized ratings with particular attention being paid to those items which showed a wide discrepancy in ratings. All

participants were encouraged to speak for or against the weights assigned. After this discussion, a final rating of the importance of the inadequacies listed was taken. This final rating process was also individually done. When summarized, these final ratings provided a weighted summary of the conclusions reached by the group.

Four Nominal Group meetings were held at Lowry and Chanute Air Force Bases. Each group contained representatives of the Evaluation Division and curriculum design and/or instructional units. Additional problem definition sessions were held with similar types of personnel from the technical training wings at Keesler and Sheppard Air Force Bases, as well as from the School of Health Care Sciences at Sheppard. While there were differences of opinion expressed at the various training sites, there was also a considerable amount of agreement across the various technical training wings.

Results from the series of field visits conducted by the project staff identified the following general system elements which were perceived as presenting some problems which might be addressed in modifying the present system.

- Time considerations

  Time lag between when a course is given and when the final Training Evaluation Report reaches the school for official action

  Problems inherent with the assessment of graduates after only a short period of time on the job

- Quality of data

  Questionnaire responses mediated by general perceptions of the graduate, not necessarily on the basis of actual observation.

  Limited use of write-in capabilities to supplement rating data

  Need for training in and understanding of the purposes of the field evaluation questionnaire by the supervisors who complete them

- Field Evaluation Questionnaire

  Questionnaire content, format, and item wording

  Limiting effects of present answer sheet format

  Adequacy of instructions to questionnaire respondents

- Sampling procedures

  Sampling of supervisors only, as opposed to graduates also

  Representativeness of graduate sample in regard to population variables such as sex, aptitude level, and educational level

- Feedback procedures

  Limited feedback to field units and to the persons completing the questionnaires

  Limited feedback to instructor personnel

- Analyses

  Descriptive only, with limited analytical capabilities

  Data not relatable to specific instruction activities or hardware system usage

  Limited capabilities for job cluster comparisons within specialty analyses

  Limited capabilities for displaying longitudinal data

- System element interfaces

  Role of instructional personnel vis-a-vis evaluation personnel in the evaluation process

  Integration of Occupational Survey data, STS data, and Training Quality Report data

- Role of the training evaluation system

  Concept of quality control and the training contract

  Validity of the requirements set by the STS

  Evaluation of resident courses in an isolated sense or as part of a total training system that includes resident course, field training, and OJT activities

- Qualification of evaluation personnel

  Limited use of highly experienced subject matter specialists in the total evaluation process

  Type of personnel making field observation visits

Using this list of field generated system elements which were perceived as presenting some problems as a guideline, the project staff generated a list of proposed activities that might be undertaken within the scope of the contractual effort to modify procedures and instruments bearing on these system elements. In generating this list, the project staff had to compromise on many occasions between judgments of what might be theoretically desirable and what might be feasible within the scope of the present study. The following activities were included in the list of potential activities.

- Integration of system data elements

  Make a comparison of STS tasks on a task-for-task basis with the Occupational Survey tasks and the statements from AFM 39-1

- Instructional analyses

  Allocate Plan of Instruction instructional blocks to tasks

  Carry out simple decision table analyses of instructional emphasis versus various measures of task importance and task performance

  Determine whether a demonstration of criterion performance for each task was required during the training course

- Field data collection procedures

  Use of two-step procedure, the first to identify problem tasks and the second to diagnose causes of the problem

  Use of "time required" and "supervision required" scales as well as the present scale to measure task proficiency

  Use of confidence level indicators along with the level of performance scale

  Use of task specific diagnostic questions

  Collection of task criticality data from supervisors

  Collection of supervisors' opinions regarding the validity of present STS standards

  Collection of data regarding reasons for non-performance of job tasks included on the STS

  Collection of data from graduates regarding perceived adequacy of resident training for job task performance and OJT activities

- Analysis activities

  Determine overall indices of training adequacy using simple decision table formats

  Describe sample in terms of within-specialty job clusters

  Compare task performance with a variety of relevant variables such as instructional time, job clusters, ability levels, and sex if relevant

  When there are a substantial number of tasks that are common over several evaluation periods, make longitudinal comparisons to ascertain trends

  Display various indices of training adequacy by job-task level to provide indications of which tasks warrant in-depth qualitative analysis

This list of proposed potential activities provided the agenda for a meeting of the project staff, the AFHRL contract monitor, and personnel from Headquarters, Air Training Command representing program planning; technical training management, standards and evaluation; and data automation support. Results of this meeting guided the project staff in developing a series of instruments and procedures for trial use on a single course. The course selected by Headquarters, Air Training Command, with the concurrence of the cognizant technical training wing and the project staff, was Course 3ABR 42330, Aircraft Electrical Systems Specialist, which was conducted by the 3350th Technical Training Wing at Chanute Air Force Base.

III. Instruments and Procedures Used

Immediately after the selection of the demonstration course, the project staff conferred with the Training Evaluation Division of the 3350th Technical Training Wing in order to coordinate the details of conducting the study within the evaluation time frame previously established for the course. It was mutually agreed that the survey process for this study would substitute for the normal process rather than be added to it, but that the modified process would produce all of the types of data normally collected, as well as those especially developed for the study. The basic content of the instruments was supplied by the Training Evaluation Division, while the format of the instruments and subsequent analyses were the responsibility of the project staff.

Copies of the five survey instruments developed for use in the study are presented in Appendix A. A basic questionnaire was designed for completion by supervisors of graduates. This was to be completed by all supervisors of graduates in the evaluation sample. Another basic questionnaire was designed for completion by the graduates themselves. This was to be completed by all graduates in the evaluation sample. Three additional supplemental questionnaires were designed for completion by supervisors of graduates. Since the purpose of their use in the study was primarily to demonstrate feasibility of their use rather than to provide definitive substantive data, each of these supplemental questionnaires was sent to approximately one-third of the sample of supervisors. The evaluation time frame, number of classes included, and sample selection within each class was all accomplished by the Training Evaluation Division in accordance with their normal evaluation procedures.

The project staff prepared initial drafts of proposed questionnaire formats using somewhat different scaling procedures. For the basic supervisor questionnaire, three different scales for rating proficiency were developed. One was the present scale which measures proficiency in terms of the amount of the total task that can be performed. A second scale measured proficiency in terms of a time dimension to perform the task satisfactorily. The third scale measured proficiency in terms of the amount of supervision needed to perform the task satisfactorily. For the basic graduate questionnaire, two different physical rating formats were developed. For each of two of the supplemental supervisor questionnaires, two different scales were developed. For the third supplemental questionnaire, a basic set of rating categories was developed as a means for generating other appropriate categories. Arrangements were made through the contract monitor to submit these draft formats to a group of experienced work center supervisors for review and criticism. Six experienced non-commissioned officers from the 89th Organizational Maintenance Squadron, and five experienced non-commissioned officers and one civilian from the 89th Field Maintenance Squadron, from the 89th Military Airlift Group at Andrews Air Force Base participated in a 2-hour critique session. The project staff used the results of this critique to select a single scale and set of categories for use on each of the five survey instruments.

The final draft revisions were sent to the Training Evaluation Division for review and comment. Final survey forms were then printed by the Air Force. The survey forms were mailed to graduates and supervisors of graduates in the evaluation sample by the Training and Evaluation Division through normal Air Force channels. The survey forms were also sent back to the Training Evaluation Division as they would normally be. After preliminary perusal by the Training Evaluation Division, the completed questionnaires were sent to the project staff for processing.

Distinguishing features of the survey questionnaires used in the study include the following.

Basic Supervisor Questionnaire

The basic content of this form was supplied by the Training Evaluation Division. It included a set of background questions required by ATC Manual 52-334, as well as a few specific questions regarding the utilization of female personnel in this Air Force Specialty Code. It also included a question developed by the project staff

regarding job clusters within the specialty. The question was phrased in terms of identifying groups of functional activities in which the most time was spent. Four such job clusters were represented by the question options. These options were developed by the project staff from data supplied by experienced work center supervisors. Responses to this question allowed for analyses in terms of job clusters within specialties. While in this study the clusters were developed rationally from supervisors' opinions, the options could be developed directly from empirically derived job clusters from Occupational Survey Reports. These data are normally available to the staff at the time of questionnaire development and could be used in development of the appropriate job cluster question options. The concept of job cluster analyses is discussed later in the section on results.

The 81 job tasks included in the proficiency rating section were supplied by the Training Evaluation Division. They basically represented those tasks from the Specialty Training Standard which were designated as a 1 or 2 proficiency level. This selection process was the one normally used to select job tasks for inclusion on the field evaluation questionnaire.

A primary difference between normal procedures and the procedures used in this study was that in this study the supervisors made all of their ratings concerning specific job tasks on the survey form itself rather than recording such ratings on a separate answer sheet (Form 1612C). This was done more from the point of view of influencing the rating process than for administrative reasons. The form was designed so that the supervisor made a series of judgments sequentially about each task. The first judgment was a direct question as to whether the graduate had performed the task since assignment to the unit. This was put first in the series in an attempt to get a statement of performance or non-performance relatively uncontaminated by any evaluative connotations. The next rating required was a conditional one depending on whether the task was performed. For those tasks not performed, the supervisor was to specify the major reason for non-performance. Five basic reasons had been developed based on opinions of experienced work center supervisors, and the rating supersivor was merely to check one or more of the five. These first two sections of the task ratings were designed to create a rating framework which made the indication of non-performance a legitimate response. One rationale for this approach was that, to the extent possible, the

proficiency level ratings were to be based on direct observations of performance. The other rationale was that the present system typically indicates a high degree of performance on all tasks, a result which seems to be logically contraindicated by the fact that the ratings are made after only a short time on the job.

The next judgment requested was for an indication of the major basis used by the supervisor in making the proficiency level judgment. The categories used were the following:

> Own Task observation. Use this if you have personally seen the graduate perform the task or a highly similar task, or if you have personally seen the product of his work on this task or a highly similar task.
>
> Task information from others. Use this if you have not personally seen the graduate perform, but are basing your rating on information you got from other supervisors or experienced journeymen who have seen the graduate perform this task or a highly similar task.
>
> General impressions. Use this if you have not observed the graduate actually perform this or a highly similar task and are basing your judgment on a general opinion based on observation of overall activities at this work site.

This step was included to reinforce the notion of rating based on actual observed performance and to provide data to determine what influence the basis for rating had on the proficiency levels indicated.

The last step requested a rating of the proficiency level demonstrated by the graduate on the job task. The scale used for this was identical to that normally used, e.g., Incapable, Extremely Limited, Partially Proficient, Competent, and Highly Proficient.

Basic Graduate Questionnaire

Past practice in evaluation of this apprentice level course did not include collecting field data from graduates themselves. It was included in this study in order to obtain direct reports of the opinions of graduates as to the adequacy of the resident course training in terms of performance on the tasks they had performed, in terms of

completion of the relevant Career Development Course (CDC) in which most were enrolled, and in terms of any additional formal Field Training Detachment (FTD) courses in which they may have participated. It also secondarily provided an index of task performance which could later be compared with supervisor reports of task performance.

The graduate questionnaire contained a few background questions called for by ATC Manual 52-334. It also included a job cluster question whose options were identical with those used in the supervisor questionnaire. In the case of the graduate, multiple responses were discouraged but allowed if the graduate felt he had spent important but equal amounts of time in more than one functional area.

The graduate questionnaire contained the same 81 job tasks as on the supervisor questionnaire. For each job task, the graduate was asked to indicate his opinion separately about the adequacy of the resident course training received for job task performance, for CDC work, and for FTD work if applicable. The scale used for all three ratings was as follows.

1 = The resident course did not provide me with the level of knowledge and skill I needed to perform assigned job tasks at the level expected of me, or to complete the CDC in the expected time period, or to satisfactorily complete FTD courses in which I participated.

2 = The resident course provided me with the level of knowledge and skill I needed to perform assigned job tasks at the level expected of me, or to complete the CDC in the expected time period, or to satisfactorily complete FTD courses in which I participated.

3 = The resident course provided me with a higher level of knowledge and skill than I needed to perform assigned job tasks at the level expected of me, or to complete the CDC in the expected time period, or to satisfactorily complete FTD courses in which I participated.

These scale values translate into crude indices of undertraining, appropriate training, and overtraining based on the opinions of the relatively inexperienced course graduates. While the experience level of the graduates is a

weakness of this type of data, graduates are the only possible source for this type of information and are a valid source of data for such information at this point in time. The real source of weakness in such data is inherent in the practice of making training value assessments after such a short period of time on the job, and this statement applies equally to the data derived from supervisors. Such weakness is the price one pays for making assessments at that time in order to gain the advantage of being able to attribute obtained results to the resident training course rather than to intervening job and OJT activities. A logical way to correct for this weakness would be to make repeat assessments later and to compare the results from the two time periods. Obtained differences using such an approach would be attributable to a combination of factors from initial training and intervening activities. If either judgmental or empirical data were collected regarding these factors, estimates could be obtained of the attributional influence of them. It was not possible to implement this approach within the constraints of the contractual effort.

Supplemental Supervisor Questionnaires

All three of the supplemental questionnaires were designed to obtain data on relevant STS tasks not associated directly with the task performance of graduates. Two of the questionnaires were designed to generate indices of task importance. The third was designed to confirm the validity of the stated STS requirements. These data were deemed to be useful for two major reasons. First, whenever one works with a large number of job tasks within a specialty, importance weights help one to focus on the most important tasks. If there are constraints which limit the number of tasks which can be given full attention, the importance weights indicate which tasks should receive priority.

The second reason for the usefulness of these data has to do with the time factor in making evaluations and providing the results to the instructional system. If the evaluation process is restricted solely to indices derived from graduates' after-training job performance, there is simply no way that the present time period can be shortened appreciably and still have results based on acceptable sample sizes. The amount of time it takes to aggregate adequate samples depends on student flow, but even in high flow courses it takes many months to build up respectable samples. On lower flow courses, the time has to be longer. If the automated data support system for the

field evaluation program were such that analyses could be done on an incremental basis, class by class, some evaluative information could be generated for a course in a shorter time frame. Such data would, of course, be more tentative in nature because they would be initially based on input from only one class and would slowly build up on a class by class basis until a respectable sample size was obtained. Such a procedure is currently within the hardware capabilities of the present data support system but the administrative feasibility of such an approach is doubtful, particularly when the cost/benefit ratio is considered.

Measures other than graduate performance, however, can be used to evaluate certain portions of the training process. Once the basic training requirements have been specified and prioritized, one can examine the instructional program itself to determine the relative amounts of instructional time devoted to each task and evaluate this allocation in terms of the prioritized requirements. In the Air Force system, the STS sets forth the basic requirements, the Program of Instruction sets forth instructional time allocations to the various tasks; and in the present study, two of the supplemental questionnaires supply indices for prioritizing these requirements in terms of importance. Time allocations can thus be compared to task importance dimensions to generate gross indices of apparent over-and under-emphasis. This was done in the present study and will be discussed later in this report. While the supplemental questionnaires were associated with the field evaluation process in the present study, they need not be. Since they are not associated directly with graduate performance, they could be administered whenever and as frequently as desired to provide up-to-date indices of task important. Such procedures and analyses can circumvent the time lag problem and supply at least partial evaluation of the training course on a more timely basis.

Supplemental Questionnaire A - Task Criticality: This questionnaire presented the supervisor with a list of relevant tasks. For each task, the supervisor was asked to make a judgment of the task's criticality for apprentice level specialists using the following scale:

0 = Task is not particularly relevant to the airman's assignment in that it is rarely if ever performed by an incumbent at the apprentice level.

1 = Task is of limited relevance to the airman's assignment. It is nice-to-know and useful but not essential in that an airman can satisfactorily perform his duty assignment without being able to perform it satisfactorily.

2 = Task is important to the airman's assignment in that ability to perform it satisfactorily will enhance mission accomplishment of the unit to which he is assigned.

3 = Task is critical to the airman's assignment in that mission accomplishment of the unit to which he is assigned cannot be attained if he cannot perform it satisfactorily.

Supplemental Questionnaire B - Training Level Standards: This questionnaire presented the supervisors with the same set of relevant STS tasks with an indication of the level of proficiency called for at the apprentice level. For each task, the supervisor was asked to indicate his judgment of whether the proficiency level specified was a realistic expectation for apprentices approximately 90 to 120 days after completion of a basic resident training course. If the supervisor did not agree with the stated level, he was asked to provide the appropriate level. Supervisors were asked to "keep in mind current manpower and budgetary constraints when making your judgments."

This type of data was designed to confirm the training level standards currently in being. Since the initial statement of training requirements is such an important part of any overall instructional system and since some questions had been raised during the early field visits about the manner in which the STS were coordinated throughout the Air Force, it was deemed useful to include this confirmation process in the present study. It is particularly appropriate to the advocates of the quality control concept as almost the sole purpose for field evaluation. These advocates argue that the STS sets forth the "training contract" between the Technical Training Wings and their Air Force users and that the only legitimate purpose of field evaluation is to check on performance against that contract. The type of data collected merely attempts to reconfirm the validity of the "contract terms" that were previously established.

Supplemental Questionnaire C - Impact of Training Deficiencies: This questionnaire also contained the same list of relevant tasks taken from the STS as those on the other supplemental questionnaires along with the present level of proficiency required for the apprentice level. For each task, the supervisor was asked to indicate his judgment as to what impact there would be on the unit if apprentice level specialists did not in fact demonstrate that level of proficiency. Eight categories were included on the questionnaire and the supervisor was asked to check any and all that applied to a given task. The categories which were derived from data obtained from a group of experienced work center supervisors were the following:

Not required. No impact since the task is not required by the incumbent of this particular duty assignment.

No impact. The task is required but performance deficiencies of apprentices would have no appreciable impact on the unit.

Upgrading impossible. Without the level specified, the incumbent could not handle required CDC and OJT assignments in order to upgrade to the 5-skill level.

Upgrading delayed. The incumbent could upgrade to the 5-skill level but would take longer than usual.

Time of others. Time of present 5-, 7-, and 9- level personnel normally available for operational duties would be diverted in order to provide additional training or supervision of the apprentices.

Reduced reliability. Reliability of unit hardware and/or weapon systems would be reduced.

Increased downtime. Out-of-service time of unit hardware and/or weapon systems would be increased.

Delayed schedules. Unit production schedules would likely be delayed.

The data provided from this questionnaire were used to generate one index of task importance. This index was also specifically included in the study in an attempt to gather data on the question raised by personnel at Headquarters, Air Training Command regarding what it

costs the Air Force if stated training requirements are not achieved by resident level courses.

A short Reactions to the Survey section was included at the end of each of the five questionnaires used in the study. Adequate space was also provided for open-ended write-in comments on each of the questionnaires.

Diagnostic Questionnaire

The basic supervisor and graduate questionnaires provided data that were primarily helpful in identifying tasks on which individual graduates had difficulty but provided little information regarding apparent causes for that difficulty. In an attempt to gather more diagnostic information, a set of 81 follow-up evaluation sheets was prepared, one for each of the 81 job tasks included on the supervisor and graduate questionnaires. While the questions for these follow-up questionnaires were slightly different from task to task, reflecting the nature of the task itself, each task sheet contained questions designed to determine the following:

Precisely what tools, equipment, and procedures are involved in the performance deficiency

Was lack of task related knowledge judged to be the primary cause of performance deficiency

Was lack of ability to apply acquired knowledge in a practical situation (skill) judged to be the primary cause of performance deficiency

Were motivational or attitudinal factors judged to be the primary cause of performance deficiency

Adequate space for open-ended comments was also provided on each task follow-up sheet.

As completed supervisor questionnaires were received, the project staff reviewed each to determine if it contained any proficiency ratings of either Incapable or Extremely Limited. A set of follow-up diagnostic sheets was sent to all supervisors who had rated one or more tasks as less than Partially Proficient. The number of sheets in any one set was equal to the number of tasks so rated. A mailing address of the supervisor completing the basic questionnaire had been requested and these were used to mail the sets of diagnostic questionnaires. It was not

expected that there would be sufficient numbers of returns on each of the separate 81 job tasks for elaborate statistical summaries, but it was anticipated that the follow-up responses would provide specific task-related information that would be helpful in looking at tasks for which other indices indicated there might be a problem.

IV RESULTS OF TRIAL SURVEY

The data in this section are those collected in regard to Course 3ABR 42330. They are presented primarily to demonstrate the type of data that were collected and analysed rather than to provide a substantive evaluation of this course. Most of the interpretations included are general in nature. They will necessarily reflect the specifics of the demonstration course, but comments about generalizations to other courses and other specialties will be included.

Description of the Evaluation Sample

The evaluation sample included in the study represented five separate classes from the technical training course. Selected from the students in these five classes were 186 graduates. Field evaluation questionnaires were sent to each of these 186 graduates and their supervisors. Ideally, an evaluation sample should be somewhat larger than this but trade-offs between time required to aggregate a larger sample and the increased reliability and validity that such samples might provide were made. Throughout the Air Force, student flow in any particular course will, of course, determine feasible evaluation samples.

Response rate:

Returns from the questionnaire mailed to the field are shown in Table 1. Overall, responses were received

Table 1
Questionnaire Response Rate

Return Status	Supervisor Questionnaires		Graduate Questionnaires		Matched Supervisor/Graduate Questionnaires	
	N	%	N	%	N	%
Returned complete	122	66	130	70	95	51
Returned incomplete	21	11	8	4	70	38
Not returned	43	23	48	26	21	11

from 143 supervisors, which represents 77% of the sample. Of these, 122 were reasonably complete and usable for later analyses. These represented 66% of the sample mailed. Overall responses were received from 138 graduates, which represents 74% of the sample. Of these, 130 were reasonably complete and usable for later analyses. These represented 70% of the sample mailed. Each technical training wing may compare these return rates with those normally received during field evaluation. Usable returns were received from both the graduate and supervisor for approximately 51% of the sample mailed, and nothing at all was heard from approximately 11% of the sample to which questionnaires were mailed. The implications of these return rates were that analyses based solely on supervisor data included about two-thirds of the sample, those based solely on graduate data included about three-quarters of the sample, and those based on comparisons of paired cases were based on about one-half of the sample.

Sample characteristics:

The distribution of grade levels is shown in Table 2 broken down by major command. Approximately 64% of the

TABLE 2
Grade Level of Graduate Responses by Major Command

Major Command	Missing	Grade Level				Command Total	
		E-2	E-3	E-4	E-5	N	%
AAC	0	1	2	0	0	3	2
ADC	0	4	0	0	0	4	3
AFSC	0	3	0	0	0	3	2
ATC	0	2	1	0	0	3	2
MAC	0	16	1	0	1	18	14
PACAF	0	4	1	0	0	5	4
SAC	1	41	18	0	0	60	46
TAC	0	7	18	1	1	27	21
USAFA	0	0	1	0	0	1	1
USAFE	0	4	2	0	0	6	5
Grade Total: n	**1**	**82**	**44**	**1**	**2**	**130**	**100**
%	**1**	**64**	**34**	**1**	**2**	**100**	**100**

sample were at the E-2 level, 34% at the E-3 level, with the remainder at E-4 and E-5. Command-wise, 46% were from SAC, 21% from TAC, 14% from MAC, with the remaining 19% being spread across seven other major commands. For this particular course, SAC is the major user of graduates, with TAC and MAC important secondary users. Table 3 shows the distribution of duty assignments of the sample. The bulk of the sample (83%) was Apprentice Aircraft Electrical System Specialists, with most of those remaining being Aircraft Electrical System Specialists.

TABLE 3
Graduate Duty Assignment by Major Command

Major Command	Apprentice Aircraft Electrical Systems Spec.	Aircraft Electrical Systems Specialist	Aircraft Electrical Systems Technician	Other
AAC	2	0	0	0
ADC	3	2	0	0
AFLC	1	0	0	0
AFSC	2	0	0	0
ATC	2	1	0	0
MAC	15	0	0	1
PACAF	4	2	0	0
SAC	48	11	1	0
TAC	17	3	0	0
USAFA	1	0	0	0
USAFE	6	0	0	0
All Commands: n	**101**	**19**	**1**	**1**
%	**83**	**16**	**<1**	**<1**

Background questions:

Several of the background questions involved the amount of formal training that had been or was being taken by the graduates after completion of the resident course. Tables 4 and 5 show data collected from graduate questionnaires in this area. Table 6 is based on data taken from the supervisor questionnaires. Approximately 58% of the responding graduate sample indicated that they had taken no formal training courses since completion of the resident course, 32% reported taking one formal

TABLE 4

Formal Training Courses Graduates Reported Taking Since Completion of Course 3ABR42330

Number of of courses	Frequency	Percent of graduates
None	76	58
1	41	32
2	8	6
3	5	4

TABLE 5

Time in Formal Training Courses Since Completion of Course 3ABR42330 Reported by Graduates

Weeks	Frequency	Percent of Graduates
None	76	58
1	7	5
2	9	7
3	11	8
4	7	5
5	3	2
6	4	3
7	1	1
8	1	1
9	2	2
12	4	3
15	1	1
16	2	2
18	1	1
26	1	1

Average weeks reported in formal training by 54 of the 130 Graduates = 5.5

course, and 10% reported taking more than one formal course. In terms of the amount of graduate time spent in such formal training courses, Table 5 indicates that the reported range was from 1 to 26 weeks, the latter being an anomaly since there theoretically was not that much time available within the evaluation time frame. About 20% of the sample reported spending between 1 to 3 weeks in formal training, while the remainder was scattered across the remaining range. The amount of training normally undertaken by resident course graduates immediately after graduation has an influence on the amount of time they can actually spend on performing job tasks within the arbitrary time frame in the present evaluation process. Specialties undoubtedly vary in this respect and interpretations from field evaluation samples should take this into consideration. While approximately 3/5 of the sample reported no additional formal course training, supervisors reported that over 9/10 of the sample was enrolled in or had completed the relevant CDC, as shown in Table 6. Supervisors also reported that almost 2/5 of the sample was or had been involved in formal FTD courses.

TABLE 6
Graduate Involvement in Additional Formal Training
Based on 122 Supervisor Reports

	Career Development Course	FTD Course
Yes	114	46
No	8	76

The final course grade was one criterion of overall success that was available from records maintained at the technical training wing. The distribution of these grades is shown in Table 7. The final grades ranged from 61 to 92 with both a mean and median grade of 77.

TABLE 7

Distribution of Final Course Grades

Grade	Frequency	Percent	Cumulative Percent
70 and below	21	11	11
71	10	5	16
72	10	5	21
73	7	4	25
74	15	8	33
75	16	9	42
76	4	2	44
77	14	8	52
78	16	9	61
79	10	5	66
80	12	6	72
81	8	4	76
82	3	2	78
83	3	2	80
84	13	7	87
85 and above	24	13	100

N = 186; Mean = 77.45; S.D. = 5.97; Range = 61-92

Since there was an interest in the capabilities of the female personnel assigned to this specialty in handling the physical aspects involved, a specific question had been included in the supervisor questionnaire by the Training Evaluation Division. There were 36 female graduates included in the overall evaluation sample of 186. Of the 122 supervisors reporting, 16 (13%) gave no response, which theoretically indicated that no females were assigned to their work site. Of the remaining supervisors, 66 (54%) indicated that females were "physically capable of performing all of the tasks in this AFSC that the male personnel normally perform," and 40 (33%) indicated that they were not. These data are presented in Table 8.

TABLE 8
Physical Capability of Females to do the Job

Response to: *Are the female personnel assigned to your shop physically capable of performing all of the tasks in the AFSC that the male personnel normally perform?*

	Frequency	
	N	%
No response or no females assigned	16	13
Yes	66	54
No	40	33

Ability Indices:

The ability levels of the evaluation sample as measured by the Armed Services Vocational Aptitude Battery (ASVAB) and the Armed Forces Qualification Test (AFQT) composite scores derived from this battery, are shown in Table 9. The distributions shown reflect the combined effects of the cut-off score of 50 on the Electronic Aptitude Index for entrance into the course and the intercorrelation of this index with the other ability scores. Inspection of the table reveals the rather severe restriction in range of scores on the Electronic and General Aptitude indices and on the AFQT Composite. Similar patterns will probably be found for other specialties with only the controlling aptitude indices changing to reflect the basic nature of the specialty involved.

In an effort to determine interaction effects between the ability scores and several different general criterion measures, a correlation matrix was developed. This is shown in Table 10. Three different criterion measures were used. One was final course grade. Another was average rated proficiency. This index was derived for any given individual by summing the performance ratings given by supervisors on each task performed and dividing by the number of tasks performed. The third criterion used was

TABLE 9
Distribution of ASVAB Ability Scores of Graduate Sample

Score	AFQT Composite		Administrative Aptitude		Electronic Aptitude		General Aptitude		Mechanical Aptitude	
	N	%	N	%	N	%	N	%	N	%
0-10	0	0	2	1	0	0	0	0	6	3
11-20	0	0	1	1	0	0	0	0	8	4
21-30	0	0	12	7	0	0	0	0	26	15
31-40	1	1	20	11	0	0	0	0	27	15
41-50	34	20	19	11	6	3	20	11	17	9
51-60	29	17	37	21	32	18	38	21	17	9
61-70	45	26	31	17	60	34	33	18	22	12
71-80	36	21	23	13	41	23	34	19	18	10
81-90	14	8	22	12	33	18	41	23	29	16
91-99	12	7	11	16	6	3	1 2	7	8	4
n	171		178		178		178		178	
Mean	65.80		61.72		72.02		71.40		55.08	
S.D.	14.44		20.54		11.67		11.67		25.39	
Range	39-97		1-95		50-95		45-95		5-95	

the supervisor's rating to the question on "Graduate's Overall Ability to Perform Duties."

A review of the matrix indicates that all of the ability measures are significantly intercorrelated with the one exception being the Mechanical and Administrative Aptitude indices. Similar results would undoubtedly be found in examining a similar matrix for any other specialty. The matrix also shows that all of the ability scores are positively correlated with final course grade. This same result has been repeatedly found in past studies on any number of different specialties. The ability scores used by the Air Force routinely predict success in training as measured by course grades. Unfortunately, the matrix also shows no significant relationships between any of the ability measures and job performance as measured by average rated proficiency. The situation is much the same when the rated overall ability to perform duties is the criterion of job performance. In this case, however, measures of General Aptitude did show a modest but

TABLE 10

Intercorrelations between Ability Indices and Indices of General Proficiency

	Administrative Aptitude	Electronic Aptitude	General Aptitude	Mechanical Aptitude	Final Grade	Average Proficiency	Overall Ability
AFQT Composite	41**	62**	74**	31**	33**	13	15
Administrative Aptitude		20**	53**	9	26**	2	10
Electronic Aptitude			43**	51**	37**	2	2
General Aptitude				24**	33**	13	22*
Mechanical Aptitude					15*	7	13
Final Course Grade						7	11
Average Proficiency							59**

* Statistically significant at 5% level; ** Statistically significant at 1% level.
N's vary between 112-178; decimal points have been omitted.

significant relationship with the criterion. This general result of ability to predict course grades but not on-the-job performance is also in line with results obtained in many previous studies. An interesting finding shown on the matrix is the significant positive relationship between the two job performance criterion measures. Because of the format of the questionnaire, most supervisors would have made and recorded their judgment on overall ability to perform duties before any consideration of the 81 tasks. Consideration of task details should therefore not have influenced these general ratings.

Tables 11 and B-1 through B-4 in Appendix B display the relationship between ability measures and the overall ability to perform measures in a somewhat different fashion. The tabular formatting of these tables allows one to directly address the question of the potential

TABLE 11

Overall Ability to Perform versus Electronic Aptitude

Electronic Aptitude Score	Missing	Unsatis-factory	Marginal	Satisfactory	Very satis-factory	Excellent
91–100	2	0	1	0	1	2
81–90	11	0	3	11	5	3
71–80	14	0	2	16	5	4
61–70	18	1	5	21	9	6
51–60	13	0	0	10	5	4
41–50	2	0	0	3	1	0
Missing	5	0	1	2	0	0
Percent of Response (n=118)		1	9	52	22	16

effects of adjusting ability cut-off scores on the rated overall ability to perform. By drawing a horizontal line across the table at any designated or hypothesized ability cut-off level and then running a perpendicular line between any two levels of the criterion that one wishes to consider, the number in each quadrant will immediately indicate the number of "good ones and bad ones" lost and "good ones and bad ones" retained by any hypothesized cut-off level. Such an analysis performed on the data from the demonstration course indicated that no possible alternative cut-off scores on one or more of the ability indices could be instituted without such action dropping more satisfactorily performing graduates than it eliminated unsatisfactorily performing graduates. Within the constraints of abilities as measured by the ASVAB (and AFQT composite) and job performance as measured by supervisor ratings of overall ability, manipulation of graduate input on these variables is not a warranted action. These data cannot, however, indicate what would happen if the gateway aptitude index (in this study Electronics at 50) were dropped. The same type of analyses could, of course, be run against other criteria of job performance. So long as one accepts the validity of the criterion measure used, this type of analysis provides a relatively simple forecast of what would happen if ability measures were raised, and it can be applied

across all specialties. Over a period of time it would be possible to successively lower the input requirements in a specialty or course until a point was reached where the cut-off allowed more unsatisfactory performers into the specialty than satisfactory ones.

General Reactions to the Survey Questionnaires

At the end of each survey questionnaire, with the exception of the diagnostic follow-up questionnaires, respondents were asked about their overall reactions to the instrument. Results of the responses to these questions are shown on Tables B-5 through B-19 in Appendix B. Reactions to the basic supervisor questionnaire indicated that both the instructions and scales were clear to the vast majority of respondents. About one-third of the supervisors took 30 minutes or less to complete the questionnaire, another third took between 30 to 45 minutes, and the remaining third took longer. There was no clear preference for responding on the questionnaire itself or on separate answer sheets although there was a slight preference for the latter. It is interesting to note that only 31% of the supervisors reported that they had previously completed a field evaluation questionnaire.

Reactions to the basic graduate questionnaire indicated that the instructions and scales were clear to the majority of the respondents. About two-fifths of the sample took 20 minutes or less to complete it, another one-third took between 25 and 35 minutes, and the remainder took longer. There was no clear preference for responding on the questionnaire itself or on separate answer sheets although there was a slight preference for the latter.

Reactions to Supplemental Questionnaire A - Task Criticality indicated that the instructions and scales were clear to the majority of the respondents. Slightly less than one-third of the respondents took 15 minutes or less to complete it, about one-half took between 20 and 30 minutes, and the remainder took longer. The vast majority of the respondents felt comfortable in making the ratings and felt they had provided valid data.

Reactions to Supplemental Questionnaire B - Training Level Standards indicated that the instructions and scales were clear to the majority of the respondents. About two-fifths of the respondents took 15 minutes or less to complete it, about one-third took between 20 to 30 minutes, and the remainder took longer. Over three-quarters of

the respondents felt comfortable in making these ratings and felt they had provided valid data. About one-eighth of the sample felt a little uneasy about doing the task but felt they had provided valid data. About one-eighth of the sample felt uneasy about making such ratings and questioned the validity of the data they provided.

Reactions to Supplemental Questionnaire C - Impact of Training Deficiency indicated that the instructions and scales were clear to the majority of the respondents. About one-half of the respondents took 25 minutes or less to complete it, about two-fifths took 30 minutes, and the remainder took longer. Almost nine-tenths of the respondents felt comfortable about making these ratings and felt they had provided valid data. The remaining one-tenth were a little uneasy about making such ratings.

Twenty-seven of the 122 supervisors (22%) used the opportunity to respond meaningfully to the open-ended comment section. Thirty-nine of the 130 graduates (30%) also provided open-ended comments.

Reactions to the questionnaires in general indicated that even though the bulk of the sample had not responded to field evaluation questionnaires before, and certainly none to the special forms used in this study, the instructions were generally well understood. Average response times per questionnaire were between 26 and 47 minutes which would appear to be well within an acceptable range. There was a slight but not strong preference for the use of separate answer sheets for the basic supervisor and graduate questionnaires. The majority of the supervisor respondents felt comfortable in making the types of ratings requested on the supplemental questionnaires and felt they had provided valid data on them. From the standpoint of user acceptability, therefore, all of the instruments used in the present study appear to be feasible for Air Force-wide use.

Analyses by Job Clusters

For the present study, the job clusters used were originally derived from data received from experienced work center supervisors which were translated into a question with four options to represent four somewhat different job clusters within the specialty. For any specialty for which there were recent Occupational Survey data, empirically determined job clusters could be used as well. The same concept could also be applied to

different types of hardware and/or weapon systems if they were of particular interest in any given specialty. Job clusters, or hardware or weapon system clusters, or any other relevant dimension could be used as a control variable with which to divide the total specialty sample into meaningful subgroups for comparative analyses. Four job clusters were utilized in the present study. They were identified by both graduates and by supervisors in the field survey through answers to the same four-option question. Supervisors were forced to choose only one job cluster. The job clusters reported by graduates and supervisors are shown in Table 12 broken down by major command. Almost one-half of the sample was in Cluster B, about one-quarter in Cluster A, and the remainder somewhat evenly split between Clusters C and D. Both Clusters C and D were shop oriented, but Cluster D specifically included the troubleshooting component while Cluster C did not.

TABLE 12
Job Tasks on Which Graduates Spent Most Time by Major Command

Major Command	Group A*		Group B*		Group C*		Group D*	
	Graduate Report	Supervisor Report	Graduate Report	Supervisor Report	Graduate Report	Supervisor Report	Graduate Report	Supervisor Report
AAC	3	1	1	1	0	0	0	0
ADC	1	2	2	3	2	0	2	0
AFLC	0	0	0	1	0	0	0	0
AFSC	0	0	2	2	0	0	1	0
ATC	0	0	2	2	1	1	0	0
MAC	5	2	10	7	3	4	6	3
PACAF	0	0	1	3	2	2	2	1
SAC	23	16	30	29	2	7	12	8
TAC	4	2	15	14	5	1	4	3
USAFA	1	1	0	0	0	0	0	0
USAFE	0	2	4	4	0	0	1	0
Group Total: N**	**37**	**26**	**67**	**66**	**15**	**15**	**28**	**15**
%***	**25**	**21**	**46**	**54**	**10**	**12**	**29**	**12**

* Group A = Battery maintenance functions
Group B = Visually inspecting and troubleshooting electrical circuits and systems on aircraft.
Group C = Performing general shop and bench checking tasks such as assembly, disassembly, and internal repair tasks.
Group D = Troubleshooting and general shop functions

** 12 of the 130 graduates reported spending equal time in more than one group.

*** Percent for graduates based on 147 total responses, including the multiple responses. Percent for supervisors based on 122 responses.

The designation of job cluster was based on responses to a question phrased in terms of the activities in which the graduate spent most of his time since completion of resident training. For cases on which both graduate and supervisor responses had been received, it was possible to check the agreement of this "most time spent" designation. Table 13 summarizes the amount of agreement between graduate and supervisor responses on this question. Best, though not total agreement, is shown for the cluster concerning troubleshooting aircraft. The battery maintenance cluster is next best, with more agreement than disagreement. For both of the remaining clusters, there was more disagreement than agreement on where most time was spent. Part of the disagreements are artifacts caused by forcing supervisors to a single rating category and allowing graduates multiple ratings. In any future uses of this approach, the question response options and rules must be identical for both supervisors and graduates so that direct comparisons can be made without contamination from the multiple response option.

TABLE 13
Reported Job Types

Graduate Reports of Most Time Spent		*Supervisor Reports of Most Time Spent*				All Graduates	
		Battery Maintenance	Troubleshooting Aircraft	Checking in Shop	Troubleshooting in Shop	N	%
Battery Maintenance		(12)	7	5	3	27	25
Troubleshooting Aircraft		3	(41)	1	5	50	45
Checking in Shop		1	3	(6)	1	11	10
Troubleshooting in Shop		3	8	3	(8)	22	20
All Supervisors:	**N**	**19**	**59**	**15**	**17**	**110**	
	%	**17**	**54**	**14**	**15**		

Note: Supervisors were forced to designate only one job type while graduates could report multiples if they spent significant equal amounts of time in more than one job type. Agreements shown by *circled entries indicate graduate reported spending a significant amount of time in job type* and supervisor indicated most time.

One analysis made by job clusters, and the same type of sub-group analysis could be made using other control variables, was to examine the extent to which each of the 81 job tasks was primarily associated with any of the job clusters. Data regarding this are shown in Table B-20 in Appendix B. All of the cell entries in this table represent percent of the total sample. The percent of the sample in each job cluster is shown in the column heading. The extent to which a given task is associated with the job cluster is determined by the amount the job task percentage is greater than or less than the appropriate column heading percentage. On those tasks where the task entry exceeds the column heading, the task tends to be associated with that job cluster. The greater the discrepancy upward, the stronger the association with that job cluster. On those tasks where the entry is less than the column heading, the tasks tend not to be associated with that job cluster. Again, the greater the discrepancy the higher the degree of disassociation. For convenience sake, the percent of the total sample reporting that the task was performed is also shown on Table B-20. It can be noted that the range between tasks is from almost none to almost all. When examining other indices of training adequacy or job proficiency at the task level, the percent performing can greatly influence whether or not something should be done in regard to a specific task.

Another analysis that was carried out by job clusters involved the overall criterion of average proficiency. The distribution of average proficiency ratings is shown in Table 14 broken down by both job cluster and major command. The mean average rated proficiency for tasks in three of the job clusters was very close. The mean for the battery maintenance cluster was somewhat higher. This could be attributed to training variables or variables associated with the difficulty level of tasks involved with the battery maintenance function. These types of survey data will not make that type of causal attribution. There was some spread on a command-wide basis from just below the level indicating "Partially Competent" to well along the way toward "Competent." An analysis of variance was carried out using the command average proficiency score data. This analysis indicated that the command differences observed in the study were not statistically significant ($F_{9,99} = 1.0248$).

Data analyses of this type, provide gross indications of the degree to which the graduates from the resident

TABLE 14
Mean Average Proficiency by Major Command and Job Type

Major Command	Job Type				Command Average
	Battery Maintenance	Troubleshooting Aircraft	Checking in Shop	Troubleshooting in Shop	
AAC	2.50	2.31	–	–	2.40
ADC	2.40	2.80	–	–	2.24
AFSC	–	2.33	–	–	2.33
ATC	–	2.39	3.17	–	2.99
MAC	3.23	2.66	2.54	2.45	2.68
PACAF	–	2.70	2.34	–	2.52
SAC	2.91	2.65	2.73	2.58	2.71
TAC	2.59	2.66	2.81	2.91	2.70
USAFA	2.67	–	–	–	2.67
USAFE	2.66	2.88	–	–	2.84
N	22	59	15	13	
Mean	2.74	2.62	2.66	2.63	
S.D.	.60	.54	.60	.66	
Range	1.34–4.00	1.38–3.90	1.55–4.00	1.28–4.00	

course are meeting the differential needs represented by command and job cluster variables. If relative deficiencies are noted for any specific type of user, consideration may be given either to trying to correct the situation at the resident course or to specifically require remedial training actions at the work site.

Reported Difficulty On The Job Or In OJT

A relevant item of concern in an evaluation of a resident course is whether or not graduates experienced any difficulties on their duty assignments which were attributable to inadequacies in the resident course training. Supervisor field evaluation questionnaires include the question "Did the graduate experience any difficulty in performing OJT duties that were due to inadequate training in the resident course?" In this study, a similar question was included in the graduate questionnaire but it was framed in terms of "on the job or in OJT activities." The number of graduates reporting having difficulty attributable to resident training course inadequacies is shown in Table 15.

TABLE 15
Difficulty on Job or OJT Reported by 130 Graduates

		Number Reporting	Percent of Relevant Sample
Reported difficulty:	Female	1	5
	Male	14	13
	Both sexes	15	12
Reported no difficulty:	Female	19	95
	Male	96	87
	Both sexes	115	88
All graduates:	Female	20	15
	Male	110	85
	Both sexes	130	100

Data for cases on which both supervisor and graduate questionnaires were available are shown in Table 16. Only 15 cases representing 12 percent of the evaluation sample reported having any difficulties. Only one female reported having difficulty. The data in Table 16 shows the amount of agreement between self reports of difficulty and supervisor reports of difficulty. If one looks at the data for all job types, it is apparent that the largest area of agreement is when both the graduate and supervisor had not perceived any difficulties. While the agreement is high for both sexes, it is somewhat higher for male graduates than for female graduates. For the ten cases in this sample of matched cases in which the graduate reported a difficulty, in only one case had the supervisor perceived any difficulty, which represents only a 10% agreement. If the results of the field evaluation for this study are representative of what usually occurs in the present system, the use of supervisor reports only may be understating the number of cases in which difficulties are being experienced. The value judgment as to which report, the graduate's or the supervisor's, is the more valid cannot be made from the survey data themselves. Even if the supervisor's judgments are deemed more valid because they presumably represent the acceptable criterion level, any sizable amount of graduate perceived difficulties which are at variance with that criterion might have a deleterious effect on the motivational level of the

TABLE 16

Reported Difficulty on Job or OJT on 96 Cases for Which Both Graduate and Supervisor Reports were Available

Supervisor Reported Difficulty on OJT by Job Type*		Graduate Reported Difficulty on Job or OJT					
		Yes			No		
		Male	Female	Both Sexes	Male	Female	Both Sexes
Battery maintenance:	Yes	(1)	0	(1)	1	0	1
	No	5	0	5	(18)	0	(18)
Troubleshooting aircraft:	Yes	0	0	0	3	1	4
	No	1	0	1	(31)	(6)	(37)
Checking in shop:	Yes	0	0	0	1	0	1
	No	0	0	0	(7)	(2)	(9)
Troubleshooting in shop:	Yes	0	0	0	0	2	2
	No	2	1	3	(12)	(2)	(14)
All Job Types:	Yes	(1)	0	(1)	5	3	8
	No	8	1	9	(68)	(10)	(78)
All supervisor ratings:		9	0	10	73	13	86
Percent agreement:		11	0	10	93	77	91

* Job type determined by graduate report of where she/he spent most time.
Circled entries indicate cases of agreement.

graduate. It would probably also mean that the graduate would not be getting remedial help on areas in which he felt weak.

Graduate Reports of Training Adequacy By Job Tasks

The graduate questionnaire requested judgments of the adequacy of the resident course for each of the job tasks in terms of tasks performed by the graduate, CDC work in which the graduate had been involved, and FTD work in which the graduate may have been involved. The graduate was requested to indicate a "not applicable" response if the task had not been performed or was not involved in CDC or FTD work. This was done largely to meet the often used argument against the use of graduate data that graduates do not know at this point in time what they are going to need to know. Scaled training adequacy responses

were requested only for those tasks in which graduates had participated and therefore did have an experiential base for making the judgments. The graduate reports of training adequacy by job task are shown in Table B-21 in Appendix B.

The type of analyses that can readily be made from this type of data will be illustrated by using the data from the Task Performance column. Similar analyses can, of course, be made for the CDC and FTD columns.

Examination of Table B-21 indicates that the modal response for 80 of the 81 job tasks was the Adequate Response. For one of the 81 tasks, as many graduates used the Inadequate response as the Adequate response. Overall, this seems to indicate a healthy picture for this particular course and no drastic changes need be contemplated on the basis of graduate perceptions of training adequacy. However, if task performance indices indicated potential deficiencies or if arbitrary cuts in training resources were mandated by external circumstances, it may be necessary to take a closer look at the task data. This may be accomplished by comparing the number of Inadequate responses and Overadequate responses. For this particular course, 53 of the 81 tasks had more Inadequate responses than Overadequate responses, and they were mostly concentrated in different STS sections which are translatable to course blocks. Only 26 of the tasks had more Overadequate responses than Inadequate responses, and these too were concentrated in different STS sections. The task population available for potential reduction based on this index of overtraining is only half the size of the task population which could perhaps stand additional, or more effective, training. There were equal numbers of Inadequate and Overadequate responses for two of the 81 job tasks. In summary, all tasks appear to be adequately trained, but approximately two-thirds of them are adequate leaning towards inadequate while only about one-third are adequate leaning towards overadequacy. Such analyses also provide one measure of overall task training adequacy. The calculated task averages shown in Table B-21 provide another measure of overall task training adequacy.

Supervisor Reports of Job Performance

Supervisor reports of the demonstrated proficiency level of recent graduates on the job tasks relevant to any given resident course have been the crux of the

present field evaluation system. They have provided the primary criterion from which to make the initial judgment of whether or not the tasks were being adequately trained. The evaluation concept is quite simple. The STS sets the level of proficiency to be obtained as a training requirement, and supervisor ratings of performance using categories roughly translatable to the levels stated in the training requirements provide the criterion of attainment. Percent attainment is then utilized as an index of training adequacy based on performance on the job. Over the years, guidelines have been provided as to what percent attainment should be used for making a judgment that remedial action at the resident course level was necessary. The 80 percent criterion has usually been applied, but unfortunately, in some cases it has been used slavishly as a rule rather than the guideline it was intended to be. The percent attainment is an index of how well recent graduates are judged to be meeting the proficiency level expected and as such is useful in identifying tasks on which significant numbers of graduates are not performing up to expectations. The index, however, can only identify the tasks but it cannot provide information as to the cause of the deficiency nor the most effective locus for remedial action. A thorough examination of all of the factors surrounding both the training and work-site factors associated with troublesome tasks should be made before recommendations for changes are made. This can only be done by personnel who are thoroughly familiar with the specialty involved.

A summary of the performance ratings provided by the supervisors in this study is presented in Table B-22 in Appendix B. For each of the 81 job tasks included on the supervisor questionnaire, the table includes the number and percent of the sample of returned cases who had not performed the task, the frequency of response in each of the proficiency levels, the percent of the sample considered meeting expectations using the Partially Proficient level as a criterion for the lower limit of acceptance, and the mean proficiency rating for the task.

If one uses the 80% criterion for a guideline, it is apparent that 21 of the 81 job tasks do not meet this criterion. This looks as if about one-quarter of the tasks show a performance deficiency and that the course is in trouble. Further examination, however, reveals that all is not that bad. To begin with, the job tasks listed on the supervisor and graduate questionnaires

exceeded the number of STS items. For example, an STS item stated as "use and care of" was reflected as two separate items on the supervisor and graduate questionnaire task list. Similarly, any STS item involving "operate, inspect, and troubleshoot" was treated as three separate job tasks. Examination of the job tasks not meeting the 80% guideline indicate that only 12 STS items are involved. For three of these items, the level of proficiency stated as a training and performance requirement was lower than the usual 2b level which roughly translates to the Partially Proficient level shown in Table B-22. Of the remaining nine STS items, all had substantial percentages of the graduates not performing the task. Two were in excess of 80%, two in the 70's, two in the 60's, and three between 48% and 58%. Thus, while performance deficiencies existed on these tasks, the effect of these deficiencies was diminished somewhat by the fact that half or more of the graduates were not performing the tasks. If the graduates simply had not been on the job long enough to get around to doing the tasks, but probably would before the end of their first assignment, then the importance of the deficiencies would not be appreciably diminished.

Data regarding tasks performed and not performed are shown in Tables B-23 and B-24 in Appendix B. Table B-23 is concerned with the amount of agreement between graduates and supervisors as to which tasks had been performed, while Table B-24 is concerned with the reasons for nonperformance at the time of the field evaluation survey. Disagreements between supervisor and graduate data have often been cited as a major reason for not including the graduates themselves in field evaluations involving apprentice level resident courses. The data in Table B-23 indicate that overall there was more agreement than disagreement for 79 of the 81 job tasks, while one task showed as much disagreement as agreement, and the remaining task showed somewhat more disagreement than agreement. The extent of agreement for the various tasks ranged from almost total agreement to roughly a fifty-fifty split. For 67 of the job tasks, the cases of disagreement were mostly when the graduates reported doing the task but the supervisor reported that the task had not been performed. For ten of the tasks, the cases of disagreement were mostly the opposite, with supervisors saying the task was performed and the graduates reporting that it was not. For four tasks the directions of the disagreements were equal. Several interpretations of the causes for the reported discrepancies are possible. It could be a semantic problem

on what does and does not constitute performing a task. More clear-cut descriptions would be the approach to this cause, although in the present study, the majority of both the supervisors and graduates reported having little difficulty with any of the instructions or scales. It could be that supervisors are just not aware of all of the tasks being performed by the graduates at the work site. Since over four-fifths of the tasks were in the direction of more graduates than supervisors reporting doing the task, this seems like a more plausible explanation of the data from the present study. The data on disagreements as to whether the graduate performed a task would not appear to be crucial in and of themselves. If, however, they are associated with tasks for which other indices of training adequacy indicate potential problems, then the reasons for the disagreements may throw some light on what, if any, remedial actions are called for.

Of more importance are reported reasons for non-performance. These data (Table B-24) were collected only from the supervisors since the graduates did not have a sufficient experience base upon which to draw. The first column in Table B-24 contains the number of graduates not performing as reported by the supervisor. The second column indicates the supervisors' opinion that while the task had not been performed in the 90-120 field evaluation time frame, it most likely would be performed during the graduate's first duty assignment and therefore does indicate an active training requirement. The remaining four columns indicate the degree of non-requirement for several different reasons associated with the particular duty assignment held by the graduate at the time of the field evaluation.

In interpreting this type of data, one can run down the column indicating the number not performing until a job task is reached which shows an appreciable number. The data on reasons should then be examined for such tasks. If the bulk of the reasons are Not Yet But Will Be, the evidence for retaining the task as a requirement is good. To the extent that the sum of the four Not Required columns approaches or exceeds the Not Yet But Will Be responses, one can question the importance of the task as a training requirement. The data for the course in the present study indicate that for 70 of the job tasks the Not Yet But Will Be responses exceeded the Not Required responses. For one task the responses were equally distributed, and for the remaining 10 tasks, the Not Required responses exceeded the Not Yet But Will Be

responses. All of these tasks involved large numbers of Not Performed responses so they should be examined in terms of whether or not they constitute a valid training requirement.

Since supervisor proficiency ratings play such an important part in the field evaluation system, an examination was made of the basis on which these ratings were reported as having been made. The distribution of bases, by task, is shown in Table B-25 in Appendix B. These data indicate that for 79 of the 81 tasks, more supervisors reported using their own observations of task performance or review of task products as the basis than either of the other two bases. For one of the tasks, more supervisors reported using task information received from others than their own, and for one task the responses were equally split. For no task did more than 7% of the supervisors report having based their proficiency ratings only on their own general impressions. An examination of mean task proficiency ratings by major basis for rating was made in order to determine the size and direction of any influence that basis might have on the ratings provided. These data are shown in Table B-26 in Appendix B. Across the 81 tasks, the mean ratings based on own task observations was 2.61 as compared with a mean rating across the 81 tasks based on task information from others of 2.40. The mean ratings across 35 tasks for which supervisors had reported basing their ratings only on their own general impressions was 2.63. In general, it appears that when supervisors base their ratings on their own observations, whether task-specific or general, they tend to rate somewhat higher than when they base their ratings on information they obtain from others. While this was true on an overall basis, task-by-task comparison indicates that for 17 of the 81 tasks, the mean ratings were somewhat higher for ratings based on information from others than on the supervisor's own observations. While the differences in mean ratings were relatively small in the survey conducted for this study, it seems desirable to hold the basis for rating as constant as possible or to identify the basis and control for it in the interpretation of the data collected.

Measures of Overall Proficiency

Adequacy of training data based on percent attainment of at least the Partially Proficient level have previously been presented in Table B-21 and discussed. Another way of looking at overall adequacy is in terms of the calculated average proficiency scores based on

supervisor ratings. A distribution of these scores is presented in Table 17.

TABLE 17
Distribution of Calculated Average Proficiency Scores

Average Proficiency	Frequency	Percent	Cumulative Percent
Below 2.00	14	12	13
2.00–2.09	5	5	16
2.10–2.19	2	2	18
2.20–2.29	5	4	22
2.30–2.39	6	5	27
2.40–2.49	7	6	33
2.50–2.59	9	8	40
2.60–2.69	13	11	51
2.70–2.79	9	8	58
2.80–2.89	8	7	65
2.90–2.99	3	3	68
3.00–3.09	19	16	83
3.10–3.19	5	4	87
3.20–3.29	3	3	90
3.30–3.39	3	3	93
3.40–3.49	2	2	94
3.50 and above	7	6	100

N = 120
Mean = 2.66
S.D. = .58
Range = 1.29–5.00

The data in this table indicate that 13% of the graduates were below 2.00, the Partially Proficient level; 55% were between 2.00 and 2.99, the Partially Proficient level; and 32% were at or above 3.00, the Competent level. These results may be compared with similar results based on the supervisors' ratings of the graduate's overall ability to perform duties as shown in Table 18. In this case, 11% of the sample were in the Unsatisfactory or Marginal category; 52% were in the Proficient category; and 37% were in the Competent and Highly Competent categories. The

TABLE 18
Distribution of Overall Ability Ratings

Ability Rating		Frequency	Percent	Cumulative Percent
Unsatisfactory	4	1	1	1
Marginal	3	12	10	11
Proficient	2	63	52	63
Competent	1	26	21	84
Highly competent	0	19	16	100

N = 121
Mean = 1.59
S.D. = .90
Range = 0–4

similarity of results obtained from using the two general criterion measures would seem to indicate that either could be used interchangeably and provide evidence of the basic reliability of the proficiency information collected from the supervisors in this study.

Supervisor judgments regarding reasons for reported less-than-satisfactory performance are shown in Table 19. Poor attitude is cited more frequently than any other reason, and inadequacy of resident course training is cited only twice.

TABLE 19
Reasons for Less Than Satisfactory Performance

Reason Reported	Overall Ability	
	Unsatisfactory	Marginal
No reason reported	0	1
Inadequate training	0	2
Poor attitude	0	5
Lack of ability	0	1
Other	1	3
All reasons	1	12

Diagnostic Follow-Up Questionnaires

In an attempt to obtain from field supervisors more detailed information about job tasks with which at least some graduates were having difficulty, follow-up evaluation sheets were sent to each supervisor who had rated a graduate's performance on one or more tasks as less than Partially Proficient. The follow-up questionnaires were thus tailor-made from a basic set of 81 job task follow-up sheets with each supervisor getting as many separate task sheets as his less-than-Partially-Proficient ratings warranted. The data in Table 20 indicate that 41 supervisors were sent follow-up questionnaires consisting of anywhere from 1 to 42 task sheets. These 41 supervisors represented 34% of the 122 supervisors who returned field evaluation questionnaires. The 41 follow-up questionnaires contained an aggregate of 419 task sheets which represented the number of task performances in the total sample that had been rated less than Partially Proficient. This is about 4% of the total number of task performances that could have been rated (81 tasks for each of 122 supervisors). Only 18 supervisors (44%) of the 41 sent follow-up questionnaires returned them to the project staff, and of these only 15 (36%) contained task specific responses.

TABLE 20
Diagnostic Questionnaire Administration

Number of Tasks per Questionnaire	Questionnaires Sent Out		Questionnaires Returned	
	Frequency	Total Task Involvement	Frequency	Total Task Involvement
1	5	5	3	2*
2	8	16	3	4*
3	5	15	4	12
4	3	12	1	4
5	1	5	1	5
6	2	12	0	0
7	3	21	2	14
10	1	10	1	0*
14	2	28	0	0
15	2	30	1	15
16	1	16	0	0
29	4	116	2	58
30	2	60	0	0
31	1	31	0	0
42	1	42	0	0
Total	**41**	**419**	**18**	**114**

* One response did not provide task data.

Data regarding the return rate and response time for the follow-up questionnaires are shown in Tables 21 and 22.

TABLE 21
Return Rate of Diagnostic Questionnaires as a Function of Number of Tasks per Questionnaire

Type of Response		Diagnostic Questionnaires Sent Out With . . .				Total
		1-5 Tasks	6-10 Tasks	11-16 Tasks	Over 16 Tasks	
Data reply:	Frequency	10	2	1	2	15
	Percent	45	33	20	25	37
Non-data reply:	Frequency	2	1	0	0	3
	Percent	9	17	0	0	7
No reply:	Frequency	10	3	4	6	23
	Percent	45	50	80	75	56
Total:	Frequency	22	6	5	8	41
	Percent	100	100	100	100	100

TABLE 22
Response Time for Return of Diagnostic Questionnaires

Number of Tasks per Questionnaire	Number of Cases	Number of Days	
		Range	Average
1	3	16-34	22.3
2	3	11-33	22.0
3	4	19-31	23.0
4	1	0	38.0
5	1	0	19.0
7	2	0	11.0
10	1	0	31.0
15	1	0	25.0
29	2	19-33	26.0

The return rate for these questionnaires was somewhat related to the number of task sheets included in the questionnaire in the expected direction of a higher return on the shorter questionnaire. But the return rate was no greater than 50% even for questionnaires having as few as between one and five sheets. There was also a slight tendency for response time to be positively related to the length of the questionnaire. Response times ranged from a low of 11 to a high of 38 calendar days against a suggested response date of four weeks. It appears that if the supervisor is going to respond, he will do so within a month. It is perhaps interesting to note that while the follow-up questionnaires were sent out with an official cover letter on Air Force stationery over a Colonel's signature, these questionnaires were the only ones for which the responses were to be sent directly to the project staff rather than to the Training Evaluation Division at the technical training wing. This may have had some deleterious effect on the motivation for a supervisor to complete and return the follow-up questionnaires. If the number of individually inadequate task performance ratings are as low for most specialties as they were in the present study, it appears that it would be feasible to conduct the follow-up procedures by telephone rather than by mail. In the present study it would have required only 41 telephone calls. Relevant responses to telephone inquiries would assure a close to 100% response and each could be probed as deeply as the situation seemed to warrant. Optimal benefit from such telephone follow-ups could be obtained only if the caller was a person thoroughly familiar with both the training course and work site procedures. Depending upon the relative qualifications of the personnel involved at any particular technical training wing at any given time, this might mean using personnel from the curriculum design or instructional units rather than personnel from the Training Evaluation Division.

In reviewing the follow-up questionnaire returns, it was found that no information had been returned for 23 of the 81 tasks. One follow-up report was returned for an additional 29 job tasks; two reports for 16 tasks; three reports for 7 tasks; four reports for 3 tasks; five reports for 1 task; six reports for 1 task; and 8 reports for 1 task. It is quite clear that this type of diagnostic follow-up data is qualitative, not quantitative in nature. The follow-up responses were turned over to the Training Evaluation Division for a qualitative analysis by specialists in the field.

Supplemental Questionnaires

Supplemental questionnaires had been sent to supervisors in order to obtain confirmation of existing training standard levels and to generate task importance indices that could be used in interpreting obtained task performance data. Table B-27 in Appendix B summarizes the data from Supplemental Questionnaire B having to do with the level of proficiency designated on the STS as required at the appropriate level. Notwithstanding the fact that the project staff had received numerous comments during the early field visits regarding the manner in which these levels were coordinated throughout major commands, the supervisors in the sample for this study overwhelmingly confirmed the levels specified in the STS. For only one item did more than 12% disagree with the stated requirement. For that one item, 29% disagreed with the level specified, e.g., 1b. Eight wanted the item upgraded to 2b and one each wanted 2a, 2c, 3b, and 3c. Field confirmation of proficiency levels does not seem to be required based on the results of the present study.

A direct measure of task criticality was requested on Supplemental Questionnaire A. The results from this questionnaire are shown in Table B-28 in Appendix B. Of the 59 elements involved, 14 (24%) received mean criticality ratings at less than the Important level. As a check on the reliability of the pooled supervisor ratings of criticality, Cronbach's Alpha coefficient was calculated using the ratings of 34 supervisors on 59 STS items. The calculated Alpha on this criticality data was .95.

Another measure of importance in terms of the impact on the unit to which the graduate is assigned if there are performance deficiencies was requested on Supplemental Questionnaire C. The results from this questionnaire are shown in Table B-29 in Appendix B. For all tasks, the extra time necessary to train and supervise apprentices was listed as the leading impact of training deficiencies. For most tasks, delayed skill upgrading was listed as the second most likely impact. Decreased system reliability was a relatively close third. Increased system downtime, no impact, production delays, and no skill upgrading followed in declining order of likely impact. An average weighted impact score was calculated by using the weights shown in Table B-29. These were chosen on a judgmental basis by the project staff. All impacts were given equal weights with task-done-but-no-impact receiving less weight, and task-not-required

responses receiving zero weights. Other weighting formulas may be derived which may be more appropriate for the immediate situation. The principle of relative task impact scores, however, would remain operative for all specialties

Two separate checks on the reliability of the pooled supervisor ratings of the impact of training deficiencies were made. Both checks involved the ratings from 45 supervisors on 59 STS items. Cronbach's Alpha was computed separately for each of the eight separate impact columns. If the impact column was checked, the item received a score of 1 and if not checked, a score of 0. The Alphas obtained were as follows:

Task Not Required	=	.91
No Impact	=	.61
Upgrading Impossible	=	.55
Delayed Upgrading	=	.55
Time of Others	=	.85
Decreased System Reliability	=	.69
Increased Downtime	=	.51
Delayed Production Schedules	=	.53

A split-half procedure was used to check the reliability of the Average Weighted Impact score. One supervisor was randomly dropped from the sample and the remaining 44 supervisors were randomly split into two groups. Split-half reliability coefficients were calculated based on all of the separate STS items and on the grouped STS items. The Pearson coefficient for the grouped data was .95 and for the separate data it was .92.

The interrelationships of the measures obtained from the supplemental questionnaires and other measures are shown in Table 23. Examination of this correlation matrix indicates that hours of instruction as specified in the relevant Program of Instruction are significantly correlated only with measures of training adequacy reported by graduates. The impact of training deficiency score is significantly correlated with all variables except hours of instruction and the STS level. Task criticality ratings are significantly correlated with all the variables except hours of instruction. Overall proficiency ratings are significantly correlated with all variables except hours of instruction and STS level. Tasks not performed correlates significantly with all variables except hours of instruction. Because of a scale reversal on this variable, the coefficients carry a minus sign, but

TABLE 23
Intercorrelations Between Specialty Training Standard Variables

	Hours of Instruction	Training Deficiency	Task Criticality	Overall Proficiency	Tasks not Performed	Training Adequacy	STS Level
Impact of training deficiency	12						
Task criticality	20	81**					
Overall proficiency	26	51**	44**				
Tasks not performed	–22	–86**	–85**	–53**			
Training adequacy	41**	62**	55**	82**	57**		
STS level	13	14	34**	5	–34*	5	
Distributional characteristics:							
N	59	59	59	42	42	42	59
Mean	5.05	1.73	2.12	2.62	22	2.00	3.44**
S.D.	8.81	.28	.46	.30	22.85	.16	1.15
Range	0-50	.67-1.94	.80-2.80	1.89-3.09	1-84	1.70-2.30	1-5

* Statistically significant at 5% level.
** Statistically significant at 1% level.
*** STS scale: 1b/=1, 1b=2, 2b/=3, 2b=4, 2c/=5.

the direction of the relationship is positive. The training adequacy measure correlates with all other variables except STS level. The STS level scale was a crudely developed scale designed to throw some light on possible relationships between level of the stated training requirement and the other variables. The variable was significantly related only to tasks not performed and task criticality ratings.

The pattern of intercorrelations of these variables leads to several conclusions. The significant relationships between the task importance indices, overall proficiency, tasks not performed, and training adequacy indicate a strong internally consistent structure of the data base collected in the study. Data collected from different sources using a variety of survey instruments produced a pattern of indices suggesting that the instruments are, in fact, measuring only slightly different aspects of the same basic factors and that they represent valid, logical linkages between the factors.

Another finding is that, at least in the present study, there is no statistically significant correlation between the number of hours of instruction allocated in the Program of Instruction and any of the task importance or task performance indices. This may raise some questions about the allocation of training hours in the course as presently structured. The hours of instruction allocations in the study were summarized by the project staff from information printed in the POI. Some assumptions had to be made in handling blocks of instruction that covered more than one STS item. The operational rule used was to divide the time allocation for the block equally between all tasks within the instructional block. This may have produced some distortion of the hours of instruction variable. Also, an STS item ceases to be listed in the POI after it was tested for criterion level performance in the course. It is probable that additional time was devoted to the item after that point but was not included in the time assigned to that task. Both of the above would lead to an understatement of the time, but since the rules were applied systematically across all tasks and instructional blocks, this should not have dramatically affected any existing statistical relationships. It is suggested that in future applications, values on the time allocation variable be derived by personnel from the curriculum design or instructional units at the technical training wing. The summary of time allocations within the POI should also include those items which were not included in the field evaluation because they involved either task knowledge only or general subject matter knowledge only. This will provide a rough index of the extent to which the course is task performance oriented. In the present study, approximately 332 hours were allocated to performance tasks included in the field survey, 20 hours to task knowledge items, and about 332 hours to general subject matter items.

Detailed Task Evaluations

The present study attempted to develop instruments and procedures that would provide more detailed information for use in the feedback step of the ISD process. The data summaries included in this section all involve the presentation of specific tasks in a tabular format designed to impart a "goodness of training" or value index for each task in relation to various factors. The concept is identical for all of the tables, the only things that change are the dimensions represented on the horizontal and vertical scales. The value scoring concept is illustrated by the illustrative table shown in Table 24.

TABLE 24
Illustrative Decision Table

Dimension Two		Dimension One: Low ◄ 0	1	2	3 ► High
Low	0	0	+1	+2	+3
↕	1	−1	0	+1	+2
↕	2	−2	−1	0	+1
High	3	−3	−2	−1	0

The assumptions for the values assigned to each cell are that if there is, or it is felt that there should be, a direct relationship between the two variables, then the diagonal represents a "best match" situation or an "O.K." situation. As one moves away from the diagonal, the situation becomes less "O.K.". For convenience sake, the cells to the upper right of the diagonal have been assigned positive weights and those to the lower left of the diagonal have been assigned negative weights. The specific interpretation of the positive and negative weights will, of course, vary depending upon the dimensions displayed in the table.

This approach may be used in a wide variety of situations to help identify where component parts of a system fall in regard to any set of relevant dimensions. It assumes that there should be a direct relationship between the two dimensions displayed on the table. The substantive meaning of the diagonal in each table will depend somewhat on how each dimension is scaled. In the present study, the cutting points for all dimensions except the STS level were established in a manner designed to divide the distribution on that dimension into nearly equal quarters. This is not critical to the method since cutting scores for any variable can be established on any logically defensible rationale. The diagnostic value of this approach will, however, be diminished if there is only a small dispersion on the dimensions displayed. For the benefit of the reader, the scale values used to delimit each dimension category are shown on the tables.

Hours of instruction: Tables B-30, B-31, and B-32 in Appendix B display task numbers in terms of hours of instruction versus three indices of task importance, e.g., task criticality, impact of training deficiencies, and STS level. Data for all of these variables are or could be made available without the time lag associated with getting on-the-job performance of graduates. In many Air Force situations, data from the relevant Occupational Survey regarding percent performing and percent of time spent performing could be used as other or substitute task importance indices. In order to do this, however, it would be necessary to equate the job tasks on the Occupational Inventory and the items on the relevant Specialty Training Standard. This equating task has already been done for some but not all specialties. The data in these tables can be interpreted in terms of adequate, over-, and under-training, keeping in mind that these are only gross indices. Nevertheless, one can examine in further detail those tasks which are farthest out of line to see if there are justifiable reasons for their being where they are. Interpretations may be tentative and indicative, certainly not definitive solely on the basis of the tabular data. The tables are designed to help experienced personnel make evaluative judgments, not to make those judgments for them.

Tables B-33, B-34, and B-35 in Appendix B display hours of instruction against dimensions collected in the field survey. These tables could not be constructed until after graduates had been out in the field. Again, data from a current relevant Occupational Survey regarding percent of incumbents performing could be used in place of the tasks not performed field data used in the present study. This again would require a matching of Occupational Inventory job tasks and STS items.

Overall proficiency: Tables B-36, B-37, B-38, and B-39 in Appendix B display rated overall proficiency against the other measures. Since rated proficiency is dependent upon job performance, these analyses could not be made until sometime after completion of the resident course.

Task criticality versus impact of training deficiency: The data in Table B-40 in Appendix B shows the relationship between the two task importance indices generated from field data. This is merely a different way for displaying the relationship shown in terms of statistical indices in the correlation matrix presented in Table 23.

Detailed interpretations of specific data included in these simple decision table formats of the data collected in this study have not been presented because they would be specific to the specialty and the resident course involved. Only persons thoroughly familiar with the specialty could make definitive recommendations from such data. The data are, however, designed to be a useful input to such personnel. A helpful step is to display all of the indices associated with a given task on a summary sheet such as that shown in Table B-41 in Appendix B.

REFERENCES

AF Regulation 50-38. *Training-field evaluation of formal school graduates.* Washington, D.C.: Department of the Air Force, 30 April 1975.

ATC Regulation 52-1. *Technical training - training evaluation and course reviews.* Randolph AFB, Texas: Headquarters, Air Training Command, 17 September 1976.

ATC Manual 52-334. *Graduate evaluation questionnaire ATC,* Randolph AFB, Texas: Headquarters, Air Training Command, 1 May 1974.

APPENDIX A

Survey Instruments

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS CHANUTE TECHNICAL TRAINING CENTER (ATC)
CHANUTE AIR FORCE BASE, ILLINOIS 61868

REPLY TO ATTN OF: 3350 TCHTW/TTS

SUBJECT: Field Evaluation Questionnaire - Crs No. C3ABR42330 000, Aircraft Electrical Systems Specialist

TO:

1. Pursuant to AFR 50-38, Field Evaluation of Formal School Graduates, this Headquarters is conducting a field evaluation of the training received by selected graduates of subject course.

2. It is requested that the IMMEDIATE SUPERVISOR OF _____ complete the attached questionnaire and answer sheets (ATC Forms 1612A and B).

3. If the supervisor cannot comply with this request, please return the questionnaire and answer sheets, and annotate this letter to show the reason for noncompletion. If the graduate has been reassigned, please provide the address of the new unit of assignment.

4. The Project Officer, Mr. Carter, may be contacted via AUTOVON at 862-2119 for further guidance or additional information regarding the questionnaire.

5. Use the inclosed self-addressed envelope to return the questionnaire and answer sheets through the Military Postal System before _____. Also, place your organizational address and office symbol in the upper left-hand corner of the return envelope.

FOR THE COMMANDER

ROBERT K. McCUTCHEN, Colonel, USAF
Commander, 3350 Technical Training Wing

1 Atch
Questionnaire & Answer Sheets w/Envelope

Record No.

80806
Survey ID.

DEPARTMENT OF THE AIR FORCE
HQ 3350TH TECHNICAL TRAINING WING (ATC)
CHANUTE AIR FORCE BASE, ILLINOIS 61868

FIELD EVALUATION QUESTIONNAIRE
FOR
COURSE NO. C3ABR42330 000, AIRCRAFT ELECTRICAL
SYSTEMS SPECIALIST

NOTICE TO SUPERVISOR

1. Your assistance is requested in rating the job performance of this airman who is under your supervision. Two separate answer sheets (ATC Forms 1612A and B) are provided for responses to the first part of the questionnaire. Responses to the second part of the questionnaire dealing with graduate proficiency should be made directly on the questionnaire itself. This format is being field tested as part of a research and development project being conducted by the American Institutes for Research under a contract for the Air Force Human Resources Laboratories. Please return both the survey form and ATC Forms 1612A and B to the above address. Space is provided at the back of the questionnaire for comments you wish to add.

2. In the space provided on ATC Form 1612A, please print your name, duty phone, and AUTOVON number.

3. Please use only a No. 2 pencil for marking ATC Forms 1612A and B.

4. IT IS IMPORTANT THAT ATC FORMS A AND B BE HANDLED CAREFULLY. Staple holes, frayed corners, paper clip impressions, extraneous pencil marks, creases, and light pencil responses will cause the scanning machine to reject the answer sheets.

This survey is being conducted under the authority of AFR 50-38 and is excluded from the approval provisions of AFRs 30-23 and 178-7.

(S)

Answer ONLY the following items on ATC Form 1612A.

1-11 - Blacken the space corresponding to Graduate's Current Grade.

1-12 - Blacken the spaces that identify Graduate's Duty AFSC. First column represents prefix (if any), the next five represent AFSC number, and the last column represents suffix (if any).

1-19 - Identify Graduate's Primary AFSC. Instructions are the same as for 1-12 above.

1-26 - Identify the Graduate's Duty Assignment by blackening one space that corresponds to one of the following numbers on the answer sheet:

(0) Apprentice Aircraft Electrical Systems Specialist.

(1) Aircraft Electrical System Specialist.

(2) Aircraft Electrical Systems Technician.

(3) Other (indicate appropriate title); _____

_____

1-27 - Identify which of the following most closely describes the tasks performed by the Graduate in your unit since graduation by blackening one space that corresponds to one of the following numbers on ATC 1612A:

(0) Spent most time, either by himself or with more experienced personnel, performing battery maintainence functions.

(1) Spent most time, either by himself or with more experienced personnel, visually inspecting and troubleshooting electrical circuits and systems on aircraft. Spent relatively little time performing shop related tasks.

(2) Spent most time, either by himself or with more experienced personnel, performing general shop and bench checking tasks, such as assembly, disassembly, and internal repair tasks.

(3) Spent most time, either by himself or with more experienced personnel, performing troubleshooting and general shop functions.

1-29 - Blacken this space if the Graduate is enrolled in or has completed CDC 42350, Aircraft Electrical Systems Specialist (AFSC 42350).

(S)

1-30 - Blacken this space if the Graduate is attending or has completed a Field Training Detachment (FTD) course(s), and enter course(s) identification here:

_____

_____

_____

1-31 thru 1-32 - Blacken the space that properly identifies this Graduate.
1-31 - Female
1-32 - Male

1-63 - Are the female personnel assigned to your shop physically capable of performing all of the tasks in this AFS that the male personnel normally perform? Blacken the space for either YES or NO.

If you marked NO, please list those tasks which the female personnel are not capable of performing: _____

_____

_____

Answer ONLY the following items on ATC Form 1612B.

2-15 - Did the Graduate have any significant OJT difficulties? If you marked YES, please explain difficulties. _____

_____

2-16 - Rate Graduate's overall ability to perform assigned duties by blackening the appropriate space.

2-17 - If you rated the Graduate MARGINAL or UNSATISFACTORY in item 2-16, blacken the one reason on the answer sheet which accounts for the low rating. If OTHER is marked, please list reason(s) here:

_____

_____

2-18 - Do you have suggestions for improving the course? If you marked YES, please list your comments on the last page of the questionnaire.

2-19 - Blacken the space corresponding to your Current Grade.

(S)

2-20 - Blacken the spaces that identify your Duty AFSC. First column represents prefix (if any), the next five represent AFSC number, and the last column represents suffix (if any).

2-27 - Blacken the appropriate spaces to identify your Primary AFSC. Instructions are the same as for 2-20 above.

2-35 - Blacken a number in each column to indicate the months you have been a supervisor in the 423X0 specialty. For example: 6 months = 06. If more than 99, blacken both 9's and enter total months here: _____.

2-40 - Blacken the space corresponding to your Major Command or Agency.

2-41 - Blacken the one space that indicates the number of female 423X0 personnel assigned to your shop.

2-45 - Blacken the spaces (numbers) that identify your SSAN.

2-54 - Blacken spaces to indicate the date you completed this questionnaire.

(S)

GRADUATE JOB PROFICIENCY

In this part of the questionnaire, you are to mark your answers directly on the questionnaire itself. In order to follow up on any questions that may arise on this experimental part of the questionnaire, please indicate your mailing address below:

Name and Rank: _____ SSAN: _____

Mailing Address: _____

_____

_____ Zip Code: _____

The job tasks listed in this part of the questionnaire were selected from Specialty Training Standard (STS) 423X0, dated July 1976. Following each task statement is the STS paragraph number. We are interested in getting from you three types of information about each of the tasks listed.

First, did or did not the graduate perform the task listed since his assignment to his present duty position. Since the resident course trains for the overall AFSC and not for a specific duty assignment, and since it has been only a short time since his completion of the course, it is highly unlikely that all graduates will perform all of the tasks listed. One purpose is to find out how many and which tasks graduates are likely to be assigned during the first 90-120 days after graduation. If the graduate performed the task, put a check mark in Column A, if not, put a check mark in Column B. If you checked Column B then put a check mark or marks in Columns C, D, E, F, G which indicate one or more reasons why he hasn't performed it. Definitions for these column headings are:

Column C - Not relevant to job. This task is not part of the job at the work site to which the graduate has been assigned.

Column D - Not yet, but will be. The graduate has not yet been asked to do this task, but more than likely he will be required to do it before completion of his first duty assignment.

Column E - Not allowed. The graduate is not assigned to do this task because of supervisory practices at this work site. He might be assigned this task if assigned to a different work site.

Column F - Not required-hardware. This task is relevant only to hardware or weapon systems which are not present at this work site. They might be at different work sites.

(S)

Column G - Not required-other. If there is any other reason why, check here and write in the reason in the comments section at the end of the questionnaire.

If you checked Column B, and one or more of Column's C-G, do not make any more ratings for that task. Proceed to the next task.

If you checked Column A (Yes), you are to indicate your judgment of the graduate's proficiency. Before you do that, however, please indicate the primary basis for your judgment. Do this by putting a check in either Column H, I, or J. The definitions for these Columns are:

Column H - Own task observation. Use this if you have personally seen the graduate perform the task or a highly similar task, or if you have personally seen the product of his work on this task or a highly similar task.

Column I - Task information from others. Use this if you have not personally seen the graduate perform, but are basing your rating on information you got from other supervisors or experienced journeymen who have seen the graduate perform this task or a highly similar task.

Column J - General impression. Use this if you have not observed the graduate actually perform this or a highly similar task and are basing your judgment on a general opinion, based on observation of overall activities at this work site.

Indicate your judgment of the graduate's proficiency level by putting a check in one of the Columns K-O. The definitions for these Columns are:

Column K - Incapable. Can do no part of the task without being told or shown how to do it. This rating applies only to assigned tasks.

Column L - Extremely Limited. Can do simple parts of the task. Needs to be told or shown how to do most of the task.

Column M - Partially Proficient. Can do most parts of the task. Needs to be helped on hardest parts.

Column N - Competent. Can do all parts of the task. Needs only a spot check of completed work.

Column O - Highly Proficient. Can do the complete task quickly and accurately. Can tell others how to do the task.

TASK	Performed or Not Performed								Basis for Rating			Proficiency Level Demonstrated				
			Reason Why Not													
	A. Task was performed	B. Task not performed. Check one or more reasons	C. Not relevant to job at this work site	D. Not yet, but will be. Will most likely be required during first assignment	E. Not allowed by supervisory practices at this site—might be at other sites	F. Not required—hardware. Relevant equipment/system not at this site	G. Not required—other. Write in reason in Comments Section of questionnaire		H. Own task observations	I. Task information from others	J. General impressions	K. Incapable	L. Extremely limited	M. Partially proficient	N. Competent	O. Highly proficient
SHOP AND FLIGHT LINE SAFETY																
1. Apply safety precautions when using tools and equipment. (3a)																
2. Practice housekeeping consistent with safety of personnel and equipment. (3b)																
3. Apply safety precautions pertaining to aircraft electrical system. (3d(5))																
4. Apply FOD instructions. (3f)																
TECHNICAL PUBLICATIONS																
5. Locate technical order numbers and titles in index type technical orders. (4a)																
6. Use technical manuals as a source of information for performing maintenance and inspections. (4b)																
7. Use abbreviated technical orders when performing inspections and maintenance. (4d)																
8. Locate maintenance, management, and administrative information in methods and procedures technical orders. (4e)																
MAINTENANCE AND INSPECTION SYSTEM AND FORMS																
9. Use maintenance data collection forms. (7d)																
ELECTRICAL MAINTENANCE FUNDAMENTALS																
10. Use handtools. (9a)																
11. Care for handtools. (9a)																
12. Solder electrical connections to include solid-state devices and printed circuits. (9b)																
13. Use solderless electrical connector devices. (9c)																
14. Perform wire maintenance. (9d)																
15. Use safetying devices. (9g)																
16. Select hardware. (9h)																
17. Use hardware. (9h)																

(S)

TASK	Performed or Not Performed								Basis for Rating			Proficiency Level Demonstrated				
	A. Task was performed	B. Task not performed. Check one or more reasons	Reason Why Not						H. Own task observations	I. Task information from others	J. General impressions	K. Incapable	L. Extremely limited	M. Partially proficient	N. Competent	O. Highly proficient
			C. Not relevant to job at this work site	D. Not yet, but will be. Will most likely be required during first assignment	E. Not allowed by supervisory practices at this site—might be at other sites	F. Not required—hardware, Relevant equipment/system not at this site	G. Not required—other. Write in reason in Comments Section of questionnaire									
METERS AND TESTERS																
18. Use frequency meters. (13a))																
19. Care for frequency meters. (13a(1))																
20. Use multimeters. (13a(2))																
21. Care for multimeters. (13a(2))																
22. Use vacuum-tube voltmeters. (13a(3))																
23. Care for vacuum-tube voltmeters. (13a(3))																
24. Use oscilloscope. (13a(5))																
25. Care for oscilloscope. (13a(5))																
TESTS STANDS AND LOADBANKS																
26. Inspect generator test stands. (14a(2))																
27. Operate generator test stands. (14a(2))																
28. Inspect inverter test stands. (14c(2))																
29. Operate inverter test stands. (14c(2))																
30. Inspect loadbanks. (14d(2))																
31. Operate loadbanks. (14d(2))																
AIRCRAFT BATTERY SHOP OPERATION																
32. Service lead acid batteries. (15a(1))																
33. Maintain lead acid batteries. (15a(1))																
34. Service alkaline batteries. (15a(2))																
35. Maintain alkaline batteries. (15a(2))																
36. Use charging equipment. (15b(2))																
37. Maintain charging equipment. (15b(3))																
38. Use servicing equipment. (15c(1))																
39. Maintain servicing equipment. (15c(2))																
AIRCRAFT POWER SYSTEMS																
40. Operate DC generator system. (16a(2))																
41. Inspect DC generator system. (16a(2))																

(S)

TASK	Performed or Not Performed								Basis for Rating			Proficiency Level Demonstrated				
			Reason Why Not													
	A. Task was performed	B. Task not performed. Check one or more reasons	C. Not relevant to job at this work site	D. Not yet, but will be. Will most likely be required during first assignment	E. Not allowed by supervisory practices at this site—might be at other sites	F. Not required—hardware, Relevant equipment/system not at this site	G. Not required—other. Write in reason in Comments Section of questionnaire		H. Own task observations	I. Task information from others	J. General impressions	K. Incapable	L. Extremely limited	M. Partially proficient	N. Competent	O. Highly proficient
AIRCRAFT POWER SYSTEMS (continued)																
42. Troubleshoot DC generator system. (16a(2))																
43. Operate AC generator system. (16b(2))																
44. Inspect AC generator system. (16b(2))																
45. Troubleshoot AC generator system. (16b(2))																
46. Operate battery system. (16c(2))																
47. Inspect battery system. (16c(2))																
48. Troubleshoot battery system. (16c(2))																
49. Operate transformer-rectifier system. (16d(2))																
50. Inspect transformer-rectifier system. (16d(2))																
51. Troubleshoot transformer-rectifier system. (16d(2))																
52. Operate rotary inverter system. (16e(2))																
53. Inspect rotary inverter system. (16e(2))																
54. Troubleshoot rotary inverter system. (16e(2))																
AIRCRAFT CONTROL AND WARNING SYSTEMS																
55. Operate lighting system. (17a(2))																
56. Inspect lighting system. (17a(2))																
57. Troubleshoot lighting system. (17a(2))																
58. Operate landing gear system. (17b(2))																
59. Inspect landing gear system. (17b(2))																
60. Troubleshooting landing gear system. (17b(2))																
61. Operate trim system. (17e(2)(a))																
62. Inspect trim system. (17e(2)(a))																
63. Troubleshoot trim system. (17e(2)(a))																
64. Operate flap control and indicating system. (17e(2)(b))																
65. Inspect flap control and indicating system. (17e(2)(b))																
66. Troubleshoot flap control and indicating system. (17e(2)(b))																
67. Operate fire warning system. (17f(2)(a))																
68. Inspect fire warning system. (17f(2)(a))																

(s)

TASK	Performed or Not Performed								Basis for Rating			Proficiency Level Demonstrated				
			Reason Why Not													
	A. Task was performed	B. Task not performed. Check one or more reasons	C. Not relevant to job at this work site	D. Not yet, but will be. Will most likely be required during first assignment	E. Not allowed by supervisory practices at this site – might be at other sites	F. Not required – hardware. Relevant equipment / system not at this site	G. Not required – other. Write in reason in Comments Section of questionnaire	H. Own task observations	I. Task information from others	J. General impressions	K. Incapable	L. Extremely limited	M. Partially proficient	N. Competent	O. Highly proficient
AIRCRAFT CONTROL AND WARNING SYSTEMS (continued)																
69. Troubleshoot fire warning system. (17f(2)(a))																
70. Operate overheat warning system. (17f(2)(b))																
71. Inspect overheat warning system. (17f(2)(b))																
72. Troubleshoot overheat warning system. (17f(2)(b))																
73. Operate takeoff warning system. (17f(2)(c))																
74. Inspect takeoff warning system. (17f(2)(c))																
75. Troubleshoot takeoff warning system. (17f(2)(c))																
76. Operate master warning system. (17f(2)(d))																
77. Inspect master warning system. (17f(2)(d))																
78. Troubleshoot master warning system. (17f(2)(d))																
79. Operate jet engine starting and ignition. (17h(2)(b))																
80. Inspect jet engine starting and ignition. (17h(2)(b))																
81. Troubleshoot jet engine starting and ignition. (17h(2)(b))																

(S)

(S)

ADDITIONAL COMMENTS

If you have suggestions or recommendations for improving training in this course, list your comments here and reference them to the appropriate numbered entries in the questionnaire.

(S)

REACTIONS TO SURVEY FORMAT

Since some of the procedures and formats included in the questionnaire you have just completed are experimental and are being field tested by the American Institutes for Research under contract to the Air Force Human Resources Laboratory, we are interested in your reactions to the questionnaire.

1. Did the instructions and questionnaire format give you a clear idea of what you were to do?

Yes____ No____

If no, what needs to be clarified?

_____

_____

_____

_____

2. Were the descriptions of the rating scales and column headings clear to you?

Yes____ No____

If no, which descriptions need to be revised?

_____

_____

_____

_____

3. Which of the following best describes your preference for recording your answers on separate answer sheets or on the questionnaire itself?

___A. I very much prefer to use separate answer sheets.
___B. I somewhat prefer to use separate answer sheets.
___C. It makes no difference to me.
___D. I somewhat prefer to write my answers on the questionnaire itself.
___E. I very much prefer to write my answers on the questionnaire itself.

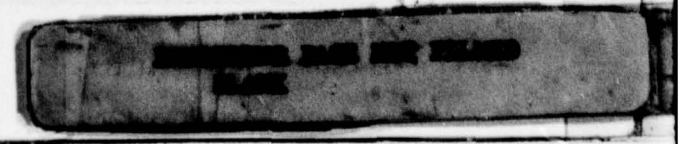
4. About how long did it take you to complete this questionnaire?

_____minutes.

5. Have you ever been required in the past to fill out a field evaluation questionnaire as the supervisor of a recent resident course graduate?

No ____ Yes ____ If yes, how many? _____

PLEASE USE THE REVERSE SIDE OF THIS PAGE TO MAKE ANY OTHER COMMENTS YOU MAY FEEL ARE APPROPRIATE ABOUT THE USE OF THIS TYPE OF A FIELD QUESTIONNAIRE TO GATHER DATA REGARDING HOW WELL THE BASIC RESIDENT COURSE HAS PREPARED AIRMEN TO PERFORM THE TASKS LIKELY TO BE ASSIGNED TO THEM ON THEIR FIRST DUTY ASSIGNMENT.



Record No.

80805
Survey ID.

DEPARTMENT OF THE AIR FORCE
HQ 3350TH TECHNICAL TRAINING WING (ATC)
CHANUTE AIR FORCE BASE, ILLINOIS 61868

FIELD EVALUATION QUESTIONNAIRE
FOR
COURSE NO. C3ABR42330 000, AIRCRAFT ELECTRICAL SYSTEMS SPECIALIST

NOTICE TO GRADUATE

1. Your assistance is requested in providing information regarding the extent to which you have used knowledges and skills acquired in Course 3ABR 42330 since completion of the course. ATC Form 1611A provided herein, is for your responses to the first part of the questionnaire. The format for the second part of the questionnaire is being field tested as part of a research and development project by the American Institutes for Research under contract to the AF Human Resources Laboratory. You are to record your responses for the second part of the questionnaire directly on this questionnaire itself. Space is provided at the end of this questionnaire for comments you may wish to add.

2. In the space provided on ATC Form 1611A, please print your name, duty phone, and AUTOVON number.

3. Please use only a No. 2 pencil for marking ATC Form 1611A.

4. IT IS IMPORTANT THAT ATC FORM 1611A BE HANDLED CAREFULLY. Staple holes, frayed corners, paper clip impressions, extraneous pencil marks, creases, and light pencil responses will cause the scanning machine to reject the answer sheets.

This survey is being conducted under the authority of AFR 50-38 and is excluded from the approval provisions of AFR's 30-23 and 178-7.

(G)

Answer ONLY the following items on ATC Form 1611A

I-11 - Blacken the space corresponding to your current grade.

I-14 - Blacken the spaces that identify your Duty AFSC. First column represents prefix (if any), the next five represent AFSC number, and the last column represents suffix (if any).

If you received any type of formal training since you completed course 3ABR42330, write in the course title and length, and blacken the corresponding number on ATC Form 1611A. If you have not received any formal training since completing the course, black in space I-46.

I-37 _____
Course Title Length in Weeks

I-38 _____
Course Title Length in Weeks

I-39 _____
Course Title Length in Weeks

I-40 _____
Course Title Length in Weeks

I-41 _____
Course Title Length in Weeks

I-46 - No formal training since completion of course 3ABR42330.

I-47 - Have you experienced any significant difficulty in performing your duties or on-the-job training that you consider the result of inadequate training in this course? If yes, explain in the Comments Section at the end of this questionnaire.

I-48 - Blacken in the space which corresponds to the Major Command or Agency to which you are assigned.

Blacken in one of the following spaces which most closely describes the types of tasks you have been doing since assignment to a unit after completion of course 3ABR42330.

I-49 - Spent most time, either by yourself or with more experienced personnel, performing battery maintenance functions.

I-50 - Spent most time, either by yourself or with more experienced personnel, visually inspecting and troubleshooting electrical circuits and systems on aircraft. Spent relatively little time performing shop related tasks.

(G)

I-51 - Spent most time, either by yourself or with more experienced personnel, performing general shop and bench checking tasks, such as assembly, disassembly, and internal repair tasks.

I-52 - Spent most time, either by yourself or with more experienced personnel, performing troubleshooting and general shop functions.

(G)

ADEQUACY OF TRAINING ON INDIVIDUAL TASKS

The following pages contain significant job tasks at the 3 skill level selected from Specialty Training Standard (STS) 423X0, July 1976. For each task listed you are to indicate whether or not you performed the task, either as part of your proficiency OJT activities or as part of your normal duty assignment, whether or not the task was involved in the Career Development Course (CDC) for upgrading to the 5 skill level, or whether or not it was involved in any Field Training Detachment (FTD) Course you may have taken since completion of course 3ABR42330.

If you have not performed the task, and it was not involved in any CDC or FTD training, you are to check the "No" column under headings "Performed Task", "Used in CDC Work", and "Used in FTD". However, if you performed the task, or if it was involved in your CDC work, or it was involved in FTD activities in which you participated, you are to indicate your opinion about how well the resident course prepared you. Use the following scale for indicating your opinion.

1 = The resident course did <u>not</u> provide me with the level of knowledge and skill I needed to perform assigned job tasks at the level expected of me, or to complete the CDC in the expected time period, or to satisfactorily complete FTD courses in which I participated.

2 = The resident course provided me with the level of knowledge and skill I needed to perform assigned job tasks at the level expected of me, or to complete the CDC in the expected time period, or to satisfactorily complete FTD courses in which I participated.

3 = The resident course provided me with a higher level of knowledge and skill than I needed to perform assigned job tasks at the level expected of me, or to complete the CDC in the expected time period, or to satisfactorily complete FTD courses in which I participated.

RATING YOUR TRAINING ON INDIVIDUAL TASKS

TASK	Performed Task				Used in CDC work				Used in FTD			
	No	If yes, adequacy			No	If yes, adequacy			No	If yes, adequacy		
		1	2	3		1	2	3		1	2	3
SHOP AND FLIGHT LINE SAFETY												
1. Apply safety precautions when using tools and equipment. (3a)												
2. Practice housekeeping consistent with safety of personnel and equipment. (3b)												
3. Apply safety precautions pertaining to aircraft electrical system. (3d(5))												
4. Apply FOD instructions. (3f)												
TECHNICAL PUBLICATIONS												
5. Locate technical order numbers and titles in index type technical orders. (4a)												
6. Use technical manuals as a source of information for performing maintenance and inspections. (4b)												
7. Use abbreviated technical orders when performing inspections and maintenance. (4d)												
8. Locate maintenance, management, and administrative information in methods and procedures technical orders. (4e)												
MAINTENANCE AND INSPECTION SYSTEM AND FORMS												
9. Use maintenance data collection forms. (7d)												
ELECTRICAL MAINTENANCE FUNDAMENTALS												
10. Use handtools. (9a)												
11. Care for handtools. (9a)												
12. Solder electrical connections to include solid-state devices and printed circuits. (9b)												
13. Use solderless electrical connector devices. (9c)												
14. Perform wire maintenance. (9d)												
15. Use safetying devices. (9g)												
16. Select hardware. (9h)												
17. Use hardware. (9h)												
METERS AND TESTERS												
18. Use frequency meters. (13a(1))												
19. Care for frequency meters. (13a(1))												
20. Use multimeters. (13a(2))												
21. Care for multimeters. (13a(2))												
22. Use vacuum-tube voltmeters. (13a(3))												
23. Care for vacuum-tube voltmeters. (13a(3))												
24. Use oscilloscope. (13a(5))												
25. Care for oscilloscope. (13a(5))												
TEST STANDS AND LOADBANKS												
26. Inspect generator test stands. (14a(2))												
27. Operate generator test stands. (14a(2))												
28. Inspect inverter test stands. (14c(2))												
29. Operate inverter test stands. (14c(2))												
30. Inspect loadbanks. (14d(2))												
31. Operate loadbanks. (14d(2))												

(G)

RATING YOUR TRAINING ON INDIVIDUAL TASKS

TASK	Performed Task				Used in CDC work				Used in FTD			
	No	If yes, adequacy			No	If yes, adequacy			No	If yes, adequacy		
		1	2	3		1	2	3		1	2	3
AIRCRAFT BATTERY SHOP OPERATION												
32. Service lead acid batteries. (15a(1))												
33. Maintain lead acid batteries. (15a(1))												
34. Service alkaline batteries. (15a(2))												
35. Maintain alkaline batteries. (15a(2))												
36. Use charging equipment. (15b(2))												
37. Maintain charging equipment. (15b(3))												
38. Use servicing equipment. (15c(1))												
39. Maintain servicing equipment. (15c(2))												
AIRCRAFT POWER SYSTEMS												
40. Operate DC generator system. (16a(2))												
41. Inspect DC generator system. (16a(2))												
42. Troubleshoot DC generator system. (16a(2))												
43. Operate AC generator system. (16b(2))												
44. Inspect AC generator system. (16b(2))												
45. Troubleshoot AC generator system. (16b(2))												
46. Operate battery system. (16c(2))												
47. Inspect battery system. (16c(2))												
48. Troubleshoot battery system. (16c(2))												
49. Operate transformer-rectifier system. (16d(2))												
50. Inspect transformer-rectifier system. (16d(2))												
51. Troubleshoot transformer-rectifier system. (16d(2))												
52. Operate rotary inverter system. (16e(2))												
53. Inspect rotary inverter system. (16e(2))												
54. Troubleshoot rotary inverter system. (16e(2))												
AIRCRAFT CONTROL AND WARNING SYSTEMS												
55. Operate lighting system. (17a(2))												
56. Inspect lighting system. (17a(2))												
57. Troubleshoot lighting system. (17a(2))												
58. Operate landing gear system. (17b(2))												
59. Inspect landing gear system. (17b(2))												
60. Troubleshoot landing gear system. (17b(2))												
61. Operate trim system. (17e(2)(a))												
62. Inspect trim system. (17e(2)(a))												
63. Troubleshoot trim system. (17e(2)(a))												
64. Operate flap control and indicating system. (17e(2)(b))												
65. Inspect flap control and indicating system. (17e(2)(b))												
66. Troubleshoot flap control and indicating system. (17e(2)(b))												
67. Operate fire warning system. (17f(2)(a))												
68. Inspect fire warning system. (17f(2)(a))												
69. Troubleshoot fire warning system. (17f(2)(a))												
70. Operate overheat warning system. (17f(2)(b))												
71. Inspect overheat warning system. (17f(2)(b))												
72. Troubleshoot overheat warning system. (17f(2)(b))												
73. Operate takeoff warning system. (17f(2)(c))												
74. Inspect takeoff warning system. (17f(2)(c))												

RATING YOUR TRAINING ON INDIVIDUAL TASKS

TASK	Performed Task				Used in CDC work				Used in FTD			
	No	If yes, adequacy			No	If yes, adequacy			No	If yes, adequacy		
		1	2	3		1	2	3		1	2	3
AIRCRAFT CONTROL AND WARNING SYSTEMS (continued)												
75. Troubleshoot takeoff warning system. (17f(2)(c))												
76. Operate master warning system. (17f(2)(d))												
77. Inspect master warning system. (17f(2)(d))												
78. Troubleshoot master warning system. (17f(2)(d))												
79. Operate jet engine starting and ignition. (17h(2)(b))												
80. Inspect jet engine starting and ignition. (17h(2)(b))												
81. Troubleshoot jet engine starting and ignition. (17h(2)(b))												

(G)

ADDITIONAL COMMENTS

If you have suggestions or recommendations for improving training in this course, list your comments here and reference them to the appropriate numbered entries in the questionnaire.

(G)

(G)

REACTIONS TO SURVEY FORMAT

Since some of the procedures and formats included in the questionnaire you have just completed are experimental and are being field tested by the American Institutes for Research under contract to the Air Force Human Resources Laboratory, we are interested in your reactions to the questionnaire.

1. Did the instructions and questionnaire format give you a clear idea of what you were to do?

Yes____ No____

If no, what needs to be clarified?

_____

_____

_____

_____

2. Were the descriptions of the rating scales and column headings clear to you?

Yes____ No____

If no, which descriptions need to be revised?

_____

_____

_____

_____

3. Which of the following best describes your preference for recording your answers on separate answer sheets or on the questionnaire itself?

___A. I very much prefer to use separate answer sheets.
___B. I somewhat prefer to use separate answer sheets.
___C. It makes no difference to me.
___D. I somewhat prefer to write my answers on the questionnaire itself.
___E. I very much prefer to write my answers on the questionnaire itself.

4. About how long did it take you to complete this questionnaire?

_____ minutes.

PLEASE USE THE REVERSE SIDE OF THIS PAGE TO MAKE ANY OTHER COMMENTS YOU MAY FEEL ARE APPROPRIATE ABOUT THE USE OF THIS TYPE OF A FIELD QUESTIONNAIRE TO GATHER DATA REGARDING HOW WELL THE BASIC RESIDENT COURSE HAS PREPARED AIRMEN TO PERFORM THE TASKS LIKELY TO BE ASSIGNED TO THEM ON THEIR FIRST DUTY ASSIGNMENT.

Record No.

80806 (A)
Survey ID.

DEPARTMENT OF THE AIR FORCE
HQ 3350TH TECHNICAL TRAINING WING (ATC)
CHANUTE AIR FORCE BASE, ILLINOIS 61868

Supplement to

FIELD EVALUATION QUESTIONNAIRE
FOR
COURSE NO. C3ABR42330 000, AIRCRAFT ELECTRICAL
SYSTEMS SPECIALIST

1. As part of a field test of a possible revised field evaluation questionnaire format, opinions of supervisors are being sought regarding the relative criticality of tasks listed in the Specialty Training Standard (STS) for the 3 skill level. All are required at one or another work sites to which resident course graduates in this AFSC may be assigned, otherwise they wouldn't be set forth as training standards. Nevertheless, some are undoubtedly more important than others in any given work site in that the impact on unit mission accomplishment is greater if there is a performance deficiency on some of the tasks than others.

2. Your assistance is requested in indicating your opinion of the relative criticality of the tasks listed. Make your judgments of criticality in terms of the particular duty assignment held by the recent graduate of the resident course whose proficiency you just rated since it is illustrative of the kind of assignment held by 3 skill level apprentices during their first duty assignment.

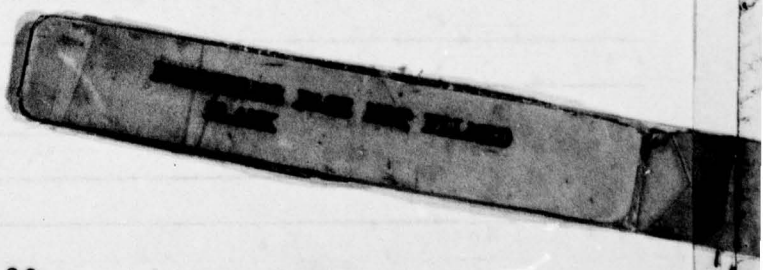
3. Record your judgments on the questionnaire itself using the following scale.

0 = Task is not particularly relevant to the airman's assignment in that it is rarely if ever performed by an incumbent at this level.

1 = Task is of limited relevance to the airman's assignment. It is nice-to-know and useful but not essential in that an airman can satisfactorily perform his duty assignment without being able to perform it satisfactorily.

2 = Task is important to the airman's assignment in that ability to perform it satisfactorily will enhance mission accomplishment of the unit to which he is assigned.

3 = Task is critical to the airman's assignment in that mission accomplishment of the unit to which he is assigned cannot be attained if he cannot perform it satisfactorily.



(A)

TASK CRITICALITY

TASK	LEVEL OF CRITICALITY			
	Not relevent 0	Limited relevance 1	Task is important 2	Task is critical 3
3. SHOP AND FLIGHT LINE SAFETY				
a. Apply safety precautions when using tools and equipment				
b. Practice housekeeping consistent with safety of personnel and equipment				
d. Apply safety precautions pertaining to				
(1) Engine air intake and exhaust				
(2) High intensity sound				
(3) Propeller and rotor planes of rotation				
(4) High voltage and antenna radiation				
(5) Aircraft electrical system				
(6) Power actuated surfaces and equipment				
e. Use portable fire extinguishers				
f. Apply FOD instructions				
4. TECHNICAL PUBLICATIONS				
a. Locate technical order numbers and titles in index type technical orders				
b. Use technical manuals as a source of information for performing maintenance and inspections				
c. Apply instructions in Time Compliance Technical Orders				
d. Use abbreviated technical orders when performing inspections and maintenance				
e. Locate maintenance, management and administrative information in methods and procedures technical orders				
7. MAINTENANCE AND INSPECTION SYSTEM AND FORMS				
d. Use maintenance data collection forms				
9. ELECTRICAL MAINTENANCE FUNDAMENTALS				
a. Use and care for handtools				
b. Solder electrical connections to include solid-state devices and printed circuits				
c. Use solderless electrical connector devices				
d. Perform wire maintenance				
g. Use safetying devices				
h. Select and use hardware				
13. METERS AND TESTERS				
a. Use and care for:				
(1) Frequency meters				
(2) Multimeters				
(3) Vacuum-tube voltmeters				
(4) Tube tester				
(5) Oscilloscope				
(8) Frequency counters				
(9) Wheatstone bridge				
14. TEST STANDS AND LOAD BANKS				
a. Generator test stands				
(2) Inspect and operate				

(A)

TASK CRITICALITY

TASK	LEVEL OF CRITICALITY			
	Not relevant 0	Limited relevance 1	Task is important 2	Task is critical 3
14. TEST STANDS AND LOAD BANKS (continued)				
b. AC control panel test sets				
(2) Inspect and operate				
c. Inverter test stands				
(2) Inspect and operate				
d. Load banks				
(2) Inspect and operate				
15. AIRCRAFT BATTERY SHOP OPERATION				
a. Service and maintain				
(1) Lead acid batteries				
(2) Alkaline batteries				
b. Charging equipment				
(2) Use				
(3) Maintain				
c. Servicing equipment				
(1) Use				
(2) Maintain				
16. AIRCRAFT POWER SYSTEMS				
a. DC generator system				
(2) Operate, inspect and troubleshoot				
b. AC generator system				
(2) Operate, inspect and troubleshoot				
c. Battery system				
(2) Operate, inspect and troubleshoot				
d. Transformer-rectifier system				
(2) Operate, inspect and troubleshoot				
e. Inverter system				
(2) Operate, inspect and troubleshoot				
(a) Rotary				
17. AIRCRAFT CONTROL AND WARNING SYSTEMS				
a. Lighting				
(2) Operate, inspect and troubleshoot				
b. Landing gear				
(2) Operate, inspect and troubleshoot				
c. Antiskid				
(2) Operate, inspect and troubleshoot				
d. Nosewheel steering				
(2) Operate, inspect and troubleshoot				
e. Secondary flight controls				
(2) Operate, inspect and troubleshoot				
(a) Trim				
(b) Flap control and indicating				

(A)

TASK CRITICALITY

TASK	LEVEL OF CRITICALITY			
	Not relevant 0	Limited relevance 1	Task is important 2	Task is critical 3
17. AIRCRAFT CONTROL AND WARNING SYSTEMS (continued)				
f. Warning				
(2) Operate, inspect and troubleshoot				
(a) Fire				
(b) Overheat				
(c) Takeoff				
(d) Master warning				
(e) Fuel				
g. Fuel control				
(2) Operate, inspect and troubleshoot				
h. Power plant electrical				
(2) Operate, inspect and troubleshoot				
(a) Control circuits				
(b) Jet engine starting and ignition				
i. Nesa Glass anti-icing				
(2) Operate, inspect, and troubleshoot				

(A)

REACTIONS TO SURVEY FORMAT

Since the format of the questionnaire you have just completed is experimental and is being field tested by the American Institutes for Research under contract to the Air Force Human Resources Laboratory, we are interested in your reactions to the questionnaire.

1. Did the instructions and questionnaire format give you a clear idea of what you were to do?

Yes ___ No ___

If no, what needs to be clarified?

_____

_____

_____

_____

2. Were the descriptions of the rating scales and column headings clear to you?

Yes ___ No ___

If no, which descriptions need to be revised?

_____

_____

_____

_____

3. Which of the following best describes your feelings about the task you just completed?

___A. I felt comfortable doing it and believe I was able to make generally reliable and valid judgments.

___B. I felt a little uneasy since I'm not sure a person in my position can make the type of judgments required, but I believe I was able to make reasonably reliable and valid judgments.

___C. I felt very uneasy since I don't believe a person in my position can make the type of judgments required reliably and validly, but I tried to supply the best data I could.

___D. I felt extremely uneasy since I feel rather strongly that a person in my position cannot make the type of judgments required, so my data should probably not be given much weight.

4. About how long did it take you to complete this questionnaire?

_____ minutes.

PLEASE USE THE REVERSE SIDE OF THIS PAGE TO MAKE ANY OTHER COMMENTS YOU MAY FEEL ARE APPROPRIATE ABOUT THE USE OF THIS TYPE OF A QUESTIONNAIRE WITH FIRST-LINE SUPERVISORS.

Record No.

80806 (B)
Survey ID.

DEPARTMENT OF THE AIR FORCE
HQ 3350TH TECHNICAL TRAINING WING (ATC)
CHANUTE AIR FORCE BASE, ILLINOIS 61868

Supplement to

FIELD EVALUATION QUESTIONNAIRE
FOR
COURSE NO. C3ABR42330 000, AIRCRAFT ELECTRICAL SYSTEMS SPECIALIST

1. As part of a field test of a possible revised field evaluation questionnaire format, opinions of supervisors are being sought regarding the validity of the levels of knowledge/proficiency specified for the 3 skill level in the Specialty Training Standard (STS), July 1976. For your convenience, the Proficiency Code Key used on the STS is shown below.

PROFICIENCY CODE KEY		
	SCALE VALUE	DEFINITION: The individual
TASK PERFORMANCE LEVELS	1	Can do simple parts of the task. Needs to be told or shown how to do most of the task. (EXTREMELY LIMITED)
	2	Can do most parts of the task. Needs help only on hardest parts. May not meet local demands for speed or accuracy. (PARTIALLY PROFICIENT)
	3	Can do all parts of the task. Needs only a spot check of completed work. Meets minimum local demands for speed and accuracy. (COMPETENT)
	4	Can do the complete task quickly and accurately. Can tell or show others how to do the task. (HIGHLY PROFICIENT)
* TASK KNOWLEDGE LEVELS	a	Can name parts, tools, and simple facts about the task. (NOMENCLATURE)
	b	Can determine step by step procedures for doing the task. (PROCEDURES)
	c	Can explain why and when the task must be done and why each step is needed. (OPERATING PRINCIPLES)
	d	Can predict, identify, and resolve problems about the task. (COMPLETE THEORY)
** SUBJECT KNOWLEDGE LEVELS	A	Can identify basic facts and terms about the subject. (FACTS)
	B	Can explain relationship of basic facts and state general principles about the subject. (PRINCIPLES)
	C	Can analyze facts and principles and draw conclusions about the subject. (ANALYSIS)
	D	Can evaluate conditions and make proper decisions about the subject. (EVALUATION)

- EXPLANATIONS -

* A task knowledge scale value may be used alone or with a task performance scale value to define a level of knowledge for a specific task. (Examples: b and 1b)

** A subject knowledge scale value is used alone to define a level of knowledge for a subject not directly related to any specific task, or for a subject common to several tasks.

– This mark is used alone instead of a scale value to show that no proficiency training is provided in the course, or that no proficiency is required at this skill level.

X This mark is used alone in course columns to show that training is not given due to limitations in resources.

(B)

2. The knowledge/proficiency level specified by the STS for the 3 skill level for selected tasks from the STS is shown on the following pages. Please indicate whether or not you feel the level specified is a realistic expectation for 3 skill level apprentices approximately 90 to 120 days after completion of the basic resident course. Record your judgments on the questionnaire in terms of the particular duty assignment held by the recent graduate whose proficiency you just rated.

3. If you feel the knowledge/proficiency level presently specified is about right, put a check mark in the "O.K." column. If not, put a check mark in the "Not O.K." column and then write in the level you feel would be more realistic in the "Should Be" column. Keep in mind current manpower and budgetary constraints when making your judgments.

AD-A066 920 AMERICAN INSTITUTES FOR RESEARCH WASHINGTON D C F/G 5/9
FIELD EVALUATION SYSTEM FOR AIR FORCE TECHNICAL TRAINING: ANALY--ETC(U)
FEB 79 C P HAHN F33615-77-C-0039
UNCLASSIFIED AFHRL-TR-78-76 NL

2 OF 2
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END
DATE FILMED
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DDC

(B)

TRAINING LEVEL STANDARDS

TASK / KNOWLEDGE	Present STS Level	O.K.	Not O.K.	Should Be
3. SHOP AND FLIGHT LINE SAFETY				
a. Apply safety precautions when using tools and equipment	2b			
b. Practice housekeeping consistent with safety of personnel and equipment	2b			
d. Apply safety precautions pertaining to				
(1) Engine air intake and exhaust	2c/c			
(2) High intensity sound	2c/c			
(3) Propeller and rotor planes of rotation	2c/c			
(4) High voltage and antenna radiation	2c/c			
(5) Aircraft electrical system	2b			
(6) Power actuated surfaces and equipment	2c/c			
e. Use portable fire extinguishers	2b/b			
f. Apply FOD instructions	2b			
4. TECHNICAL PUBLICATIONS				
a. Locate technical order numbers and titles in index type technical orders	2b			
b. Use technical manuals as a source of information for performing maintenance and inspections	2b			
c. Apply instructions in Time Compliance Technical Orders	2b/b			
d. Use abbreviated technical orders when performing inspections and maintenance	2b			
e. Locate maintenance, management and administrative information in methods and procedures technical orders	2b			
7. MAINTENANCE AND INSPECTION SYSTEM AND FORMS				
d. Use maintenance data collection forms	2b			
9. ELECTRICAL MAINTENANCE FUNDAMENTALS				
a. Use and care for handtools	2b			
b. Solder electrical connections to include solid-state devices and printed circuits	2b			
c. Use solderless electrical connector devices	2b			
d. Perform wire maintenance	2b			
g. Use safetying devices	1b			
h. Select and use hardware	2b			
13. METERS AND TESTERS				
a. Use and care for:				
(1) Frequency meters	2b/1a			
(2) Multimeters	2b			
(3) Vacuum-tube voltmeters	2b			
(4) Tube tester	2b			
(5) Oscilloscope	1b			
(8) Frequency counters	1b/b			
(9) Wheatstone bridge	2b/b			
14. TEST STANDS AND LOAD BANKS				
a. Generator test stands				
(2) Inspect and operate	2b			
b. AC control panel test sets				
(2) Inspect and operate	2b			

(B)

TRAINING LEVEL STANDARDS

TASK / KNOWLEDGE	Present STS Level	O.K.	Not O.K.	Should Be
14. TEST STANDS AND LOAD BANKS (continued)				
c. Inverter test stands				
(2) Inspect and operate	1b			
d. Load banks				
(2) Inspect and operate	1b			
15. AIRCRAFT BATTERY SHOP OPERATION				
a. Service and maintain				
(1) Lead acid batteries	2b			
(2) Alkaline batteries	2b			
b. Charging equipment				
(2) Use	1b			
(3) Maintain	1b/b			
c. Servicing equipment				
(1) Use	1b			
(2) Maintain	1b			
16. AIRCRAFT POWER SYSTEMS				
a. DC generator system				
(2) Operate, inspect and troubleshoot	2b			
b. AC generator system				
(2) Operate, inspect and troubleshoot	2b			
c. Battery system				
(2) Operate, inspect and troubleshoot	2b			
d. Transformer-rectifier system				
(2) Operate, inspect and troubleshoot	2b			
e. Inverter system				
(2) Operate, inspect and troubleshoot				
(a) Rotary	1b			
17. AIRCRAFT CONTROL AND WARNING SYSTEMS				
a. Lighting				
(2) Operate, inspect and troubleshoot	2b			
b. Landing gear				
(2) Operate, inspect and troubleshoot	2b			
c. Antiskid				
(2) Operate, inspect and troubleshoot	2b			
d. Nosewheel steering				
(2) Operate, inspect and troubleshoot	2b			
e. Secondary flight controls				
(2) Operate, inspect and troubleshoot				
(a) Trim	2b			
(b) Flap control and indicating	2b			
f. Warning				
(2) Operate, inspect and troubleshoot				
(a) Fire	2b			
(b) Overheat	2b			
(c) Takeoff	2b			
(d) Master warning	2b			
(e) Fuel	1b/X			

(B)

TRAINING LEVEL STANDARDS

TASK / KNOWLEDGE	Present STS Level	O.K.	Not O.K.	Should Be
17. AIRCRAFT CONTROL AND WARNING SYSTEMS (continued)				
g. Fuel control				
(2) Operate, inspect and troubleshoot	1b/X			
h. Power plant electrical				
(2) Operate, inspect and troubleshoot				
(a) Control circuits	1b/a			
(b) Jet engine starting and ignition	2b			
i. Nesa glass anti-icing				
(2) Operate, inspect, and troubleshoot	1b/a			

(B)

REACTIONS TO SURVEY FORMAT

Since the format of the questionnaire you have just completed is experimental and is being field tested by the American Institutes for Research under contract to the Air Force Human Resources Laboratory, we are interested in your reactions to the questionnaire.

1. Did the instructions and questionnaire format give you a clear idea of what you were to do?

Yes ___ No ___

If no, what needs to be clarified?

_____

_____

_____

_____

2. Were the descriptions of the rating scales and column headings clear to you?

Yes ___ No ___

If no, which descriptions need to be revised?

_____

_____

_____

_____

3. Which of the following best describes your feelings about the task you just completed?

___A. I felt comfortable doing it and believe I was able to make generally reliable and valid judgments.

___B. I felt a little uneasy since I'm not sure a person in my position can make the type of judgments required, but I believe I was able to make reasonably reliable and valid judgments.

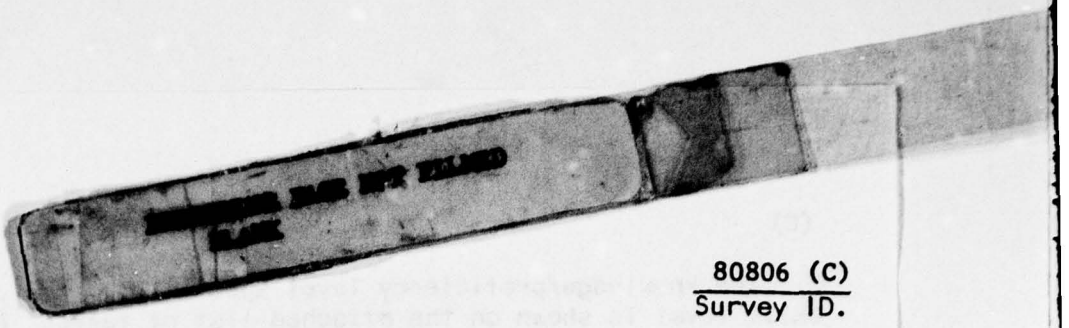
___C. I felt very uneasy since I don't believe a person in my position can make the type of judgments required reliably and validly, but I tried to supply the best data I could.

___D. I felt extremely uneasy since I feel rather strongly that a person in my position cannot make the type of judgments required, so my data should probably not be given much weight.

4. About how long did it take you to complete this questionnaire?

_____ minutes.

PLEASE USE THE REVERSE SIDE OF THIS PAGE TO MAKE ANY OTHER COMMENTS YOU MAY FEEL ARE APPROPRIATE ABOUT THE USE OF THIS TYPE OF A QUESTIONNAIRE WITH FIRST-LINE SUPERVISORS.



Record No.

80806 (C)
Survey ID.

DEPARTMENT OF THE AIR FORCE
HQ 3350TH TECHNICAL TRAINING WING (ATC)
CHANUTE AIR FORCE BASE, ILLINOIS 61868

Supplement to

FIELD EVALUATION QUESTIONNAIRE
FOR
COURSE NO. C3ABR42330 000, AIRCRAFT ELECTRICAL SYSTEMS SPECIALIST

1. As part of a field test of a possible revised field evaluation questionnaire format, opinions of supervisors are being sought regarding the impact on their unit if 3 skill level apprentices who are recent graduates of the basic resident course do not demonstrate the knowledge/proficiency level for tasks specified in the Specialty Training Standard (STS). To refresh your memory, the Proficiency Code Key used in the STS is shown below.

PROFICIENCY CODE KEY		
	SCALE VALUE	DEFINITION: The Individual
TASK PERFORMANCE LEVELS	1	Can do simple parts of the task. Needs to be told or shown how to do most of the task. (EXTREMELY LIMITED)
	2	Can do most parts of the task. Needs help only on hardest parts. May not meet local demands for speed or accuracy. (PARTIALLY PROFICIENT)
	3	Can do all parts of the task. Needs only a spot check of completed work. Meets minimum local demands for speed and accuracy. (COMPETENT)
	4	Can do the complete task quickly and accurately. Can tell or show others how to do the task. (HIGHLY PROFICIENT)
* TASK KNOWLEDGE LEVELS	a	Can name parts, tools, and simple facts about the task. (NOMENCLATURE)
	b	Can determine step by step procedures for doing the task. (PROCEDURES)
	c	Can explain why and when the task must be done and why each step is needed. (OPERATING PRINCIPLES)
	d	Can predict, identify, and resolve problems about the task. (COMPLETE THEORY
** SUBJECT KNOWLEDGE LEVELS	A	Can identify basic facts and terms about the subject. (FACTS)
	B	Can explain relationship of basic facts and state general principles about the subject. (PRINCIPLES)
	C	Can analyze facts and principles and draw conclusions about the subject. (ANALYSIS)
	D	Can evaluate conditions and make proper decisions about the subject. (EVALUATION)

- EXPLANATIONS -

* A task knowledge scale value may be used alone or with a task performance scale value to define a level of knowledge for a specific task. (Examples: b and 1b)

** A subject knowledge scale value is used alone to define a level of knowledge for a subject not directly related to any specific task, or for a subject common to several tasks.

– This mark is used alone instead of a scale value to show that no proficiency training is provided in the course, or that no proficiency is required at this skill level.

X This mark is used alone in course columns to show that training is not given due to limitations in resources

(C)

2. The knowledge/proficiency level specified by the July 1976 STS for the 3 skill level is shown on the attached list of tasks. For each task listed, check the probable impact on your unit if graduates approximately 90 to 120 days after completion of the resident course do not demonstrate the level specified. Record your judgments on the questionnaire in terms of the particular duty assignment held by the recent graduate whose proficiency you just rated.

3. Check as many impact areas as you feel are appropriate. The definitions of the Impact Deficiency columns are as follows:

Not required. No impact since the task is not required by the incumbent of this particular duty assignment.

No impact. The task is required but performance deficiencies of apprentices would have no appreciable impact on the unit.

Upgrading impossible. Without the level specified, the incumbent could not handle required CDC and OJT assignments in order to upgrade to the 5 skill level.

Upgrading delayed. The incumbent could upgrade to the 5 skill level but would take longer than usual.

Time of others. Time of present 5, 7, and 9 level personnel normally available for operational duties would be diverted in order to provide additional training or supervision of the apprentices.

Reduced reliability. Reliability of unit hardware and/or weapon systems would be reduced.

Increased down time. Out-of-service time of unit hardware and/or weapon systems would be increased.

Delayed schedules. Unit production schedules would likely be delayed.

(C)

TASK/KNOWLEDGE	Present STS Level	Impact of Deficiency of 3 Skill Level Apprentices							
		Not required	No impact	Upgrading impossible	Upgrading delayed	Time of others	Reduced reliability	Increased downtime	Delayed schedule
3. SHOP AND FLIGHT LINE SAFETY									
a. Apply safety precautions when using tools and equipment	2b								
b. Practice housekeeping consistent with safety of personnel and equipment	2b								
d. Apply safety precautions pertaining to									
(1) Engine air intake and exhaust	2c/c								
(2) High intensity sound	2c/c								
(3) Propeller and rotor planes of rotation	2c/c								
(4) High voltage and antenna radiation	2c/c								
(5) Aircraft electrical system	2b								
(6) Power actuated surfaces and equipment	2c/c								
e. Use portable fire extinguishers	2b/b								
f. Apply FOD instructions	2b								
4. TECHNICAL PUBLICATIONS									
a. Locate technical order numbers and titles in index type technical orders	2b								
b. Use technical manuals as a source of information for performing maintenance and inspections	2b								
c. Apply instructions in Time Compliance Technical Orders	2b/b								
d. Use abbreviated technical orders when performing inspections and maintenance	2b								
e. Locate maintenance, management and administrative information in methods and procedures technical orders	2b								
7. MAINTENANCE AND INSPECTION SYSTEM AND FORMS									
d. Use maintenance data collection forms	2b								
9. ELECTRICAL MAINTENANCE FUNDAMENTALS									
a. Use and care for handtools	2b								
b. Solder electrical connections to include solid-state devices and printed circuits	2b								
c. Use solderless electrical connector devices	2b								
d. Perform wire maintenance	2b								
g. Use safetying devices	1b								
h. Select and use hardware	2b								
13. METERS AND TESTERS									
a. Use and care for:									
(1) Frequency meters	2b/1a								
(2) Multimeters	2b								
(3) Vacuum-tube voltmeters	2b								
(4) Tube tester	2b								
(5) Oscilloscope	1b								
(8) Frequency counters	1b/b								

(C)

TASK/KNOWLEDGE	Present STS Level	Impact of Deficiency of 3 Skill Level Apprentices							
		Not required	No impact	Upgrading impossible	Upgrading delayed	Time of others	Reduced reliability	Increased downtime	Delayed schedule
13. METERS AND TESTERS (continued)									
a. Use and care for:									
(9) Wheatstone bridge	2b/b								
14. TEST STANDS AND LOAD BANKS									
a. Generator test stands									
(2) Inspect and operate	2b								
b. AC control panel test sets									
(2) Inspect and operate	2b								
c. Inverter test stands									
(2) Inspect and operate	1b								
d. Load banks									
(2) Inspect and operate	1b								
15. AIRCRAFT BATTERY SHOP OPERATION									
a. Service and maintain									
(1) Lead acid batteries	2b								
(2) Alkaline batteries	2b								
b. Charging equipment									
(2) Use	1b								
(3) Maintain	1b/b								
c. Servicing equipment									
(1) Use	1b								
(2) Maintain	1b								
16. AIRCRAFT POWER SYSTEMS									
a. DC generator system									
(2) Operate, inspect and troubleshoot	2b								
b. AC generator system									
(2) Operate, inspect and troubleshoot	2b								
c. Battery system									
(2) Operate, inspect and troubleshoot	2b								
d. Transformer-rectifier system									
(2) Operate, inspect and troubleshoot	2b								
e. Inverter system									
(2) Operate, inspect and troubleshoot									
a. Rotary	1b								
17. AIRCRAFT CONTROL AND WARNING SYSTEMS									
a. Lighting									
(2) Operate, inspect and troubleshoot	2b								
b. Landing gear									
(2) Operate, inspect and troubleshoot	2b								
c. Antiskid									
(2) Operate, inspect and troubleshoot	2b								
d. Nosewheel steering									
(2) Operate, inspect and troubleshoot	2b								

(C)

TASK/KNOWLEDGE	Present STS Level	Impact of Deficiency of 3 Skill Level Apprentices							
		Not required	No impact	Upgrading impossible	Upgrading delayed	Time of others	Reduced reliability	Increased downtime	Delayed schedule
17. AIRCRAFT CONTROL AND WARNING SYSTEMS (continued)									
e. Secondary flight controls									
(2) Operate, inspect and troubleshoot									
(a) Trim	2b								
(b) Flap control and indicating	2b								
f. Warning									
(2) Operate, inspect and troubleshoot									
(a) Fire	2b								
(b) Overheat	2b								
(c) Takeoff	2b								
(d) Master warning	2b								
(e) Fuel	1b/X								
g. Fuel control									
(2) Operate, inspect and troubleshoot	1b/X								
h. Power plant electrical									
(2) Operate, inspect and troubleshoot									
(a) Control circuits	1b/a								
(b) Jet engine starting and ignition	2b								
i. Nesa glass anti-icing									
(2) Operate, inspect, and troubleshoot	1b/a								

(C)

REACTIONS TO SURVEY FORMAT

Since the format of the questionnaire you have just completed is experimental and is being field tested by the American Institutes for Research under contract to the Air Force Human Resources Laboratory, we are interested in your reactions to the questionnaire.

1. Did the instructions and questionnaire format give you a clear idea of what you were to do?

Yes ___ No ___

If no, what needs to be clarified?

_____

_____

_____

_____

2. Were the descriptions of the rating scales and column headings clear to you?

Yes ___ No ___

If no, which descriptions need to be revised?

_____

_____

_____

_____

3. Which of the following best describes your feelings about the task you just completed?

___A. I felt comfortable doing it and believe I was able to make generally reliable and valid judgments.

___B. I felt a little uneasy since I'm not sure a person in my position can make the type of judgments required, but I believe I was able to make reasonably reliable and valid judgments.

___C. I felt very uneasy since I don't believe a person in my position can make the type of judgments required reliably and validly, but I tried to supply the best data I could.

___D. I felt extremely uneasy since I feel rather strongly that a person in my position cannot make the type of judgments required, so my data should probably not be given much weight.

4. About how long did it take you to complete this questionnaire?

_____ minutes.

PLEASE USE THE REVERSE SIDE OF THIS PAGE TO MAKE ANY OTHER COMMENTS YOU MAY FEEL ARE APPROPRIATE ABOUT THE USE OF THIS TYPE OF A QUESTIONNAIRE WITH FIRST-LINE SUPERVISORS.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS CHANUTE TECHNICAL TRAINING CENTER (ATC)
CHANUTE AIR FORCE BASE, ILLINOIS 61868

REPLY TO
ATTN OF: TTS

SUBJECT: Follow-Up on Field Evaluation Questionnaire for Course No. C3ABR42330 000, Aircraft Electrical Systems Specialist

TO:

1. Thank you for completing and returning the Field Evaluation Questionnaire on subject course. Your responses will be combined with those of supervisors of other recent graduates of the course. (This survey is being conducted under the authority of AFR 50-38 and is excluded from the approval provisions of AFRs 30-23 and 178-7.)

2. As part of a field test of a modified field evaluation system, we are following up on those tasks on which you rated Airman _____, Record No. _____, incapable of performing at the required level. A separate sheet is inclosed for each task on which you rated the graduate's performance as inadequate. Please answer the questions and return the separate task sheet(s). Feel free to use the back of the task sheet(s) to include any comments and opinions regarding task performance and training that you feel may help the Technical School to do a more effective job in supplying operational units with graduates who can perform at the skill levels reflected in the Specialty Training Standard.

3. You may contact Mr. Carter via AUTOVON at 862-2119 for further guidance or additional information regarding the task sheet(s).

4. Use the inclosed self-addressed envelope to return the task sheet(s) through the Military Postal System before _____.

FOR THE COMMANDER

J. EDWARD LORENZ, Colonel, USAF
Deputy Commander for Technical Training

1 Atch
Task Sheet(s)
w/Envelope

APPENDIX B

Data Summaries

TABLE B-1

Overall Ability to Perform versus General Aptitude

General Aptitude Score	Missing	Unsatis-factory	Marginal	Satisfactory	Very satis-factory	Excellent
91–100	5	0	1	2	3	1
81–90	13	0	1	16	4	7
71–80	13	0	1	10	4	6
61–70	9	0	4	12	6	2
51–60	15	0	1	14	5	3
41–50	5	1	3	7	4	0
Missing	5	0	1	2	0	0
Percent of responses (n=118)		**1**	**9**	**52**	**22**	**16**

TABLE B-2

Overall Ability to Perform versus Mechanical Aptitude

Mechanical Aptitude Score	Missing	Unsatis-factory	Marginal	Satisfactory	Very satis-factory	Excellent
91–100	3	0	1	2	2	0
81–90	6	0	2	11	4	6
71–80	4	0	1	7	4	2
61–70	9	0	2	6	2	3
51–60	6	0	0	4	3	4
41–50	8	0	1	6	1	1
31–40	10	0	1	13	2	1
21–30	7	1	2	9	6	1
11–20	4	0	1	0	2	1
1–10	3	0	0	3	0	0
Missing	5	0	1	2	0	0
Percent of responses (n=118)		**1**	**9**	**52**	**22**	**16**

TABLE B-3
Overall Ability to Perform versus Administrative Aptitude

Administrative Aptitude Score	Missing	Unsatisfactory	Marginal	Satisfactory	Very Satisfactory	Excellent
91-100	4	0	2	3	1	1
81-90	10	0	0	3	6	3
71-80	8	0	2	8	2	3
61-70	8	0	1	17	4	1
51-60	12	0	1	11	8	5
41-50	6	0	1	9	2	1
31-40	5	1	3	5	3	3
21-30	6	0	0	4	0	2
11-20	1	0	0	0	0	0
1-10	0	0	1	1	0	0
Missing	5	0	1	2	0	0
Percent of Responses (n=118)		**1**	**9**	**52**	**22**	**16**

TABLE B-4
Overall Ability to Perform versus AFQT

AFQT Score	Missing	Unsatisfactory	Marginal	Satisfactory	Very Satisfactory	Excellent
91-100	4	0	0	5	2	1
81-90	4	0	2	4	1	3
71-80	12	0	5	6	3	10
61-70	9	0	0	23	11	2
51-60	15	0	1	10	2	1
41-50	13	1	3	10	6	1
31-40	0	0	0	0	1	0
Missing	8	0	1	5	0	1
Percent of Responses (n=114)		**1**	**10**	**51**	**23**	**16**

TABLE B-5
Supervisor Reactions to Basic Questionnaires

	Clear	Not Clear	No Response
Clarity of instructions	114	6	2
Clarity of scales	116	3	3

TABLE B-6
Reported Time for Supervisors to Complete Basic Proficiency Questionnaire

Minutes	Frequency	Percent of those responding (n=120)
Not reported	2	–
10 or less	6	5
15	1	1
20	6	5
25	4	3
30	24	20
35	4	3
40	9	8
45	26	22
50	4	3
55	1	1
60	16	13
70	1	1
80	1	1
90	11	9
Over 90	6	5

Average response time of 120 respondents = 47.0 minutes

37 of 120 respondents (31%) had completed one or more training Training Evaluation questionnaires previously.

TABLE B-7
Supervisor Preference for Use of Separate Answer Sheet

Preference	Frequency
Much prefer separate answer sheets	19
Somewhat prefer separate answer sheets	14
Makes no difference	64
Somewhat prefer responding on questionnaires	13
Much prefer responding on questionnaires	9
No response	**3**

TABLE B-8
Graduate Reactions to Questionnaire Format

	Clear	Not Clear	No Response
Clarity of instructions	82	13	35
Clarity of scales	90	6	34

TABLE B-9
Reported Time for Graduates to Complete Questionnaire

Minutes	Frequency	Percent of those responding (n=94)
10 or less	5	5
15	17	18
20	15	16
25	2	2
30	26	28
35	4	4
40	3	3
45	8	9
50	2	2
60	8	9
70	1	1
90	3	3
No response	34	–

Average response time of 94 respondents = 31.6 minutes

TABLE B-10
Graduate Preference for use of Separate Answer Sheets

Preference	Frequency
Much prefer separate answer sheets	19
Somewhat prefer separate answer sheets	16
Makes no difference	52
Somewhat prefer responding on questionnaires	5
Much prefer responding on questionnaires	4
No response	**34**

TABLE B-11
Supervisor Reaction to Task Criticality Questionnaire Supplement A

	Clear	Not Clear	No Response
Clarity of instructions	45	0	0
Clarity of scales	45	0	0

TABLE B-12
Reported Time for Supervisors to Make Task Criticality Ratings

Minutes	Frequency	Percent of those responding (n=34)
10 or less	5	11
15	8	18
20	8	18
25	4	9
30	9	20
45	5	11
50	1	2
60	3	7
Over 90	2	4

Average response time for 34 respondents = 30.1 minutes

TABLE B-13
Supervisor Confidence in Making Task Criticality Ratings

Feelings About Making Ratings	Frequency
Comfortable	35
Little uneasy	8
Very uneasy	2
Extremely uneasy	0

TABLE B-14
Supervisor Reaction to Training Level Standards Questionnaire—Supplement B

	Clear	Not Clear	No Response
Clarity of instructions	41	1	0
Clarity of scales	41	1	0

TABLE B-15
Reported Time for Supervisors to Make Training Level Standards Ratings

Minutes	Frequency	Percent of those responding (n=40)
Not reported	2	–
5	2	5
10	5	13
15	9	23
20	4	10
25	1	3
30	9	23
40	4	10
45	2	5
50	2	5
55	1	3
60	1	3

Average response time of 40 respondents = 25.9 minutes

TABLE B-16
Supervisor Confidence in Making Training Standards Ratings

Feelings About Making Ratings	*Frequency*
Comfortable	32
Little uneasy	5
Very uneasy	4
Extremely uneasy	1

TABLE B-17
Supervisor Reaction to Training Deficiency Impact Questionnaire—Supplement C

	Clear	Not Clear	No Response
Clarity of instructions	33	1	0
Clarity of scales	34	0	0

TABLE B-18
Reported Time for Supervisors to Make Training Deficiency Impact Ratings

Minutes	Frequency	Percent of those responding (n=34)
10 or less	3	9
15	6	18
17	1	3
20	6	18
25	1	3
30	14	41
40	1	3
45	1	3
Over 90	1	3

Average response time of 34 respondents = 26.1 minutes

TABLE B-19
Supervisor Confidence in Making Training Deficiency Impact Ratings

Feelings About Making Ratings	Frequency
Comfortable	25
Little uneasy	5
Very uneasy	4
Extremely uneasy	0

TABLE B-20

Task Performance by Type of Task on which Most Time was Spent

Based on reports of 122 Supervisors; cell entries are percent of total sample

Task Number	Type of Tasks				Percent of Total Sample Reporting Task was Performed
	Battery Maintenance (n=26, %=21)	Troubleshooting on Aircraft (n=66, %=54)	Checking in Shop (n=15, %=12)	Troubleshooting in Shop (n=15,%=12)	
1	22	54	12	13	98
2	22	54	12	13	98
3	17	59	11	14	89
4	21	54	13	13	90
5	14	60	14	13	77
6	20	53	13	13	92
7	14	58	12	15	75
8	16	54	12	18	47
9	19	54	14	13	89
10	21	54	13	13	98
11	21	54	12	13	94
12	19	52	14	15	60
13	16	57	14	14	84
14	15	58	13	14	89
15	16	58	13	14	91
16	18	56	13	13	93
17	19	55	13	13	95
18	12	54	18	16	41
19	8	59	16	16	40
20	21	55	13	13	92
21	21	53	13	13	84
22	9	64	18	9	9
23	0	63	25	13	6
24	25	25	25	25	7
25	29	29	29	14	6
26	20	33	33	13	12
27	22	39	26	13	19
28	60	20	20	0	4
29	25	63	13	0	7
30	23	40	27	10	25
31	18	51	18	13	32
32	29	37	17	17	52
33	30	34	19	17	52
34	36	36	13	15	50
35	35	37	13	15	51
36	34	37	16	13	62
37	34	38	14	14	53
38	36	36	14	14	59
39	38	35	13	14	57
40	5	79	5	11	16
41	5	73	9	14	18

continued

TABLE B-20 (continued)

Task Number	Type of Tasks				Percent of Total Sample Reporting Task was Performed
	Battery Maintenance (n=26, %=21)	Troubleshooting on Aircraft (n=66, %=54)	Checking in Shop (n=15, %=12)	Troubleshooting in Shop (n=15, %=12)	
42	5	74	11	11	16
43	11	69	8	11	51
44	10	72	8	10	50
45	11	70	9	11	47
46	13	69	5	12	61
47	11	69	6	14	59
48	11	68	6	14	52
49	9	74	6	11	44
50	9	74	6	11	44
51	7	73	7	13	37
52	15	84	0	0	11
53	15	85	0	0	11
54	10	90	0	0	8
55	13	66	6	15	67
56	13	65	8	14	70
57	13	66	7	13	68
58	5	71	5	18	31
59	4	71	6	19	39
60	5	70	5	20	33
61	0	77	6	17	29
62	0	74	6	20	29
63	0	74	6	21	28
64	8	70	5	16	30
65	8	71	5	16	31
66	5	73	5	16	30
67	9	68	6	16	65
68	10	66	8	16	66
69	7	70	7	16	57
70	10	68	5	17	48
71	12	68	5	15	48
72	8	69	4	19	39
73	6	59	6	29	14
74	6	56	6	31	13
75	7	50	7	36	11
76	6	72	4	17	38
77	4	73	4	18	37
78	5	73	5	18	33
79	10	60	10	20	33
80	10	64	8	18	41
81	10	67	8	16	42

TABLE B-21

Graduate Reports of Training Adequacy by Job Task

	Job Task Number	Adequacy for Task Performance					Adequacy for CDC Work					Adequacy for FTD Training				
		NA	1	2	3	Average	NA	1	2	3	Average	NA	1	2	3	Average
Safety	1	10	1	87	32	2.3	26	3	80	21	2.2	95	1	25	9	2.2
	2	7	6	84	33	2.2	29	4	75	22	2.2	94	1	27	8	2.2
	3	20	5	81	24	2.2	30	7	72	21	2.1	90	1	29	10	2.2
	4	22	11	69	28	2.2	36	8	64	22	2.1	94	3	23	10	2.2
Publica-tions	5	13	15	88	14	2.0	65	16	40	9	1.9	89	6	27	8	2.0
	6	11	15	81	23	2.1	62	15	42	11	1.9	89	5	28	8	2.1
	7	27	20	69	14	1.9	67	16	40	7	1.9	100	5	19	6	2.0
	8	30	28	59	13	1.9	68	21	32	9	1.8	104	7	13	6	2.0
Forms	9	14	12	80	24	2.1	54	10	53	13	2.0	101	4	18	7	2.1
Funda-mentals	10	8	8	83	31	2.2	45	11	58	16	2.1	102	2	16	10	2.3
	11	8	7	84	31	2.2	44	12	59	15	2.0	101	3	16	10	2.2
	12	25	13	67	25	2.1	50	19	49	12	1.9	107	6	10	7	2.0
	13	11	13	81	25	2.1	52	12	53	13	2.0	104	6	13	7	2.0
	14	8	10	90	22	2.1	45	14	61	10	2.0	103	5	14	8	2.1
	15	9	11	90	20	2.1	38	17	64	11	1.9	99	6	17	8	2.1
	16	5	15	87	23	2.1	51	11	58	10	2.0	106	3	13	8	2.2
	17	7	13	88	22	2.1	54	12	56	8	1.9	105	3	15	7	2.2
Meters/ Testers	18	55	20	44	11	1.9	63	18	43	6	1.8	110	5	11	4	2.0
	19	49	20	51	10	1.9	53	18	51	8	1.9	110	6	9	5	2.0
	20	8	7	82	33	2.2	45	10	59	16	2.1	100	5	16	9	2.1
	21	12	8	79	31	2.2	40	13	59	18	2.1	103	5	15	7	2.1
	22	83	17	22	8	1.8	63	26	33	8	1.7	114	5	9	2	1.8
	23	87	19	17	7	1.7	66	28	29	7	1.7	117	4	7	2	1.8
	24	74	15	34	7	1.9	68	20	36	6	1.8	114	5	9	2	1.8
	25	82	15	25	8	1.9	71	21	34	4	1.7	117	4	7	2	1.8
Test Stands/ Load Banks	26	66	19	37	8	1.8	62	19	46	3	1.8	119	2	8	1	1.9
	27	63	18	41	8	1.9	57	24	46	3	1.7	116	4	9	1	1.8
	28	77	19	27	7	1.8	64	23	41	2	1.7	119	3	7	1	1.8
	29	77	21	26	6	1.7	66	24	38	2	1.7	119	3	7	1	1.8
	30	53	26	43	8	1.8	54	23	49	4	1.8	114	4	10	2	1.9
	31	46	30	47	7	1.7	58	19	49	4	1.8	114	4	10	2	1.9
Battery Shop	32	55	9	45	21	2.2	36	5	79	10	2.1	114	2	8	6	2.3
	33	49	7	51	23	2.2	33	8	75	14	2.1	113	2	8	7	2.3
	34	48	12	46	24	2.1	35	10	73	12	2.0	109	4	10	7	2.1
	35	49	11	47	23	2.1	38	9	72	11	2.0	108	3	10	9	2.3
	36	39	11	53	27	2.2	37	13	67	13	2.0	109	2	11	8	2.3
	37	42	14	53	21	2.1	41	13	66	10	2.0	111	2	10	7	2.3
	38	36	9	63	22	2.1	37	9	72	12	2.0	106	4	12	8	2.2
	39	37	14	56	23	2.1	42	10	67	11	2.0	108	3	11	8	2.2

continued

TABLE B-21 (continued)

	Job Task Number	Adequacy for Task Performance					Adequacy for CDC Work					Adequacy for FTD Training				
		NA	1	2	3	Average	NA	1	2	3	Average	NA	1	2	3	Average
A/C Power Systems	40	74	16	34	6	1.8	54	20	52	4	1.8	104	4	18	4	2.0
	41	64	18	37	11	1.9	48	19	57	6	1.8	99	4	22	5	2.0
	42	66	22	33	9	1.8	51	17	57	5	1.8	101	3	22	4	2.0
	43	41	22	55	12	1.9	46	1	22	53	1.8	90	5	29	6	2.0
	44	42	21	55	12	1.9	46	19	59	6	1.8	94	3	28	5	2.1
	45	44	26	49	11	1.8	43	21	58	8	1.9	91	4	30	5	2.0
	46	44	17	56	13	2.0	48	18	58	6	1.9	93	6	27	4	1.9
	47	47	16	54	13	2.0	48	18	58	6	1.9	93	6	27	4	1.9
	48	50	19	49	12	1.9	51	18	54	7	1.9	96	6	24	4	1.9
	49	59	23	41	7	1.8	50	27	48	5	1.7	96	10	21	3	1.8
	50	55	24	43	8	1.8	49	28	48	5	1.7	93	9	24	4	1.9
	51	62	24	37	7	1.8	54	27	45	4	1.7	99	7	21	3	1.9
	52	78	23	23	6	1.7	53	27	47	3	1.7	106	8	13	3	1.8
	53	77	23	24	6	1.7	56	28	44	2	1.6	104	7	16	3	1.8
	54	76	25	25	4	1.6	56	27	45	2	1.7	105	7	15	3	1.8
AC Control/ Warning Systems	55	46	17	54	13	2.0	61	13	47	9	1.9	99	3	24	4	2.0
	56	32	20	61	17	2.0	53	12	52	13	2.0	94	4	26	6	2.1
	57	34	16	62	18	2.0	52	12	54	12	2.0	93	3	28	6	2.1
	58	55	15	45	15	2.0	48	16	57	9	1.9	95	4	27	4	2.0
	59	48	22	48	12	1.9	46	19	57	8	1.9	96	4	26	4	2.0
	60	53	19	48	10	1.9	44	23	57	6	1.8	95	5	25	5	2.0
	61	65	24	32	9	1.8	55	28	42	5	1.7	96	8	22	4	1.9
	62	68	21	32	9	1.8	57	23	46	4	1.7	97	6	23	4	1.9
	63	68	23	32	7	1,7	58	24	45	3	1.7	100	6	20	4	1.9
	64	66	20	36	8	1.8	55	21	51	3	1.8	98	6	23	3	1.9
	65	69	19	35	7	1.8	57	19	51	3	1.8	98	6	23	3	1.9
	66	70	21	32	7	1.8	59	19	49	3	1.8	99	7	21	3	1.9
	67	38	17	60	15	2.0	51	10	60	9	2.0	93	3	29	5	2.1
	68	35	16	63	16	2.0	51	10	61	8	2.0	92	2	30	6	2.1
	69	41	18	57	14	2.0	51	11	60	8	2.0	94	3	27	6	2.1
	70	45	19	54	12	1.9	52	13	58	7	1.9	92	3	29	6	2.1
	71	41	22	55	12	1.9	52	13	58	7	1.9	93	3	28	6	2.1
	72	50	23	45	12	1.9	52	12	58	8	1.9	95	4	25	6	2.1
	73	66	19	37	8	1.8	56	19	51	4	1.8	93	4	26	7	2.1
	74	67	20	35	8	1.8	55	20	49	6	1.8	96	3	25	6	2.1
	75	71	19	35	5	1.7	60	18	48	4	1.8	99	4	23	4	2.0
	76	57	18	45	10	1.9	54	21	47	8	1.8	97	4	24	5	2.0
	77	58	18	44	10	1.9	52	20	50	8	1.8	95	5	26	4	2.0
	78	63	19	39	9	1.9	53	18	53	6	1.8	96	3	28	3	2.0
	79	75	18	32	5	1.8	62	20	45	3	1.8	105	6	17	2	1.8
	80	69	23	32	6	1.7	62	22	42	4	1.7	103	8	16	3	1.8
	81	73	19	32	6	1.8	62	20	44	4	1.8	101	7	19	3	1.9

* 1 = Somewhat less than adequate; 2 = Adequate; 3 = Somewhat more than necessary.

** Average score based only on graduates reporting involvement in the task.

TABLE B-22

Distribution of Performance Ratings*

Job Task Number	STS Item Number	Data Missing	Task Not Performed		Frequency of Response Level of Proficiency					Percent Partly Proficient or Better	Average Rated Proficiency	
			N	%	Not Capable (0)	Very Limited (1)	Partly Proficient (2)	Competent (3)	Highly Competent (4)		N	Mean
1	3a	1	2	2	–	1	21	78	19	99	119	2.97
2	3b	2	2	2	–	2	14	73	29	98	118	3.09
3	3d5	1	13	11	–	1	19	65	23	99	108	3.02
4	3f	8	6	5	–	3	15	66	24	97	108	3.03
5	4a	2	28	23	–	9	35	41	7	90	92	2.50
6	4b	1	9	7	–	9	41	49	13	92	112	2.59
7	4d	3	30	25	–	5	31	43	10	94	89	2.65
8	4e	2	64	52	–	9	18	24	5	84	56	2.45
9	7d	5	9	7	–	8	34	52	14	93	108	2.67
10	9a	4	3	2	–	3	20	68	24	97	115	2.98
11	9a	7	3	2	–	2	15	71	24	98	112	3.04
12	9b	3	47	39	1	5	21	37	8	92	72	2.64
13	9c	1	19	16	–	3	20	60	19	97	102	2.93
14	9d	1	14	11	–	5	28	58	16	98	107	2.79
15	9g	2	11	9	–	4	20	65	20	96	109	2.93
16	9h	3	8	7	1	6	24	63	17	94	111	2.80
17	9h	2	6	5	–	3	23	66	22	97	114	2.94
18	13al	5	69	57	1	5	20	19	3	88	48	2.38
19	13al	1	73	60	1	6	17	19	5	85	48	2.44
20	13a2	4	10	8	1	5	22	62	19	95	108	2.88
21	13a2	3	17	14	–	6	19	59	18	94	102	2.87
22	13a3	2	110	90	–	1	3	3	3	90	10	2.80
23	13a3	2	113	93	–	1	2	1	3	86	7	2.86
24	13a5	1	114	93	1	–	2	4	–	86	7	2.50
25	13a5	2	114	93	–	–	3	3	–	100	6	2.50
26	14a2	6	102	84	–	3	4	6	1	79	14	2.36
27	14a2	1	98	80	–	9	5	9	–	61	23	2.00
28	14c2	1	116	95	–	2	–	2	1	60	5	2.40
29	14c2	2	112	92	–	6	–	2	–	25	8	2.50
30	14d2	1	91	75	–	6	13	9	2	80	30	2.33
31	14d2	1	82	67	–	12	12	14	1	69	39	2.10
32	15a1	6	54	54	–	2	18	29	13	96	62	2.85
33	15a1	2	57	47	–	3	18	30	12	95	63	2.81
34	15a2	1	60	49	–	2	15	33	11	97	61	2.87
35	15a2	1	59	48	–	2	16	33	11	97	62	2.85
36	15b2	1	45	37	–	1	19	43	13	99	76	2.89
37	15b3	1	56	46	–	4	16	35	10	94	65	2.78
38	15c1	1	49	40	–	1	16	42	13	99	72	2.93
39	15c2	1	52	43	–	2	15	39	13	97	69	2.91
40	16a2	3	101	83	–	4	7	7	–	78	18	2.17
41	16a2	3	98	80	–	3	9	9	–	86	21	2.29

continued

* Based on 122 Supervisor reports.

TABLE B-22 (continued)

Job Task Number	STS Item Number	Data Missing	Task Not Performed		Frequency of Response Level of Proficiency					Percent Partly Proficient or Better	Average Rated Proficiency	
					Not Capable	Very Limited	Partly Proficient	Competent	Highly Competent			
			N	%	(0)	(1)	(2)	(3)	(4)		N	Mean
42	16a2	1	102	84	1	4	8	5	1	74	19	2.05
43	16b2	–	60	49	1	18	20	19	4	69	62	2.11
44	16b2	–	61	50	1	15	21	20	4	74	61	2.18
45	16b2	–	65	53	5	13	20	14	5	68	57	2.02
46	16c2	1	47	39	1	7	25	35	6	89	74	2.51
47	16c2	1	50	41	1	7	24	33	6	89	71	2.51
48	16c2	–	59	48	2	13	19	24	5	76	63	2.27
49	16d2	–	67	55	1	7	17	25	5	87	54	2.52
50	16d2	1	67	55	–	7	17	25	5	87	54	2.52
51	16d2	1	76	62	–	7	15	19	4	84	45	2.44
52	16 e2a	–	109	89	1	3	5	4	–	69	13	1.92
53	16e2a	–	109	89	1	2	5	5	–	77	13	2.08
54	16e2a	1	111	91	2	3	2	3	–	50	10	1.60
55	17a2	10	32	26	–	3	24	42	11	96	80	2.76
56	17a2	1	36	30	–	2	26	46	11	98	85	2.78
57	17a2	2	38	31	1	9	29	34	9	88	82	2.50
58	17b2	–	84	69	–	6	13	16	3	84	38	2.42
59	17b2	–	74	61	–	8	16	20	4	83	48	2.42
60	17b2	–	82	67	1	13	9	13	4	65	40	2.15
61	17e2a	1	87	71	1	8	9	13	3	74	34	2.26
62	17e2a	1	87	71	1	6	9	15	3	79	34	2.38
63	17e2a	1	88	72	1	9	10	10	3	70	33	2.15
64	17e2b	–	85	70	1	4	9	19	4	86	37	2.57
65	17e2b	–	84	69	1	3	11	19	4	89	38	2.58
66	17e2b	–	85	70	2	7	12	13	3	76	37	2.22
67	17f2a	–	43	35	–	6	16	47	10	92	79	2.77
68	17f2a	–	42	34	–	5	21	43	11	94	80	2.75
69	17f2a	3	52	43	2	7	18	31	9	87	67	2.57
70	17f2b	1	63	52	–	7	14	27	10	88	58	2.69
71	17f2b	1	64	52	–	7	15	26	9	88	57	2.65
72	17f2b	2	74	61	1	4	14	19	8	89	46	2.63
73	17f2c	–	105	86	–	3	4	8	2	82	17	2.52
74	17f2c	–	106	87	–	3	4	8	1	81	16	2.44
75	17f2c	–	108	89	–	2	3	6	3	86	14	2.71
76	17f2d	–	75	61	–	5	17	19	6	89	47	2.55
77	17f2d	–	77	63	–	6	17	18	4	87	45	2.44
78	17f2d	–	82	67	1	8	16	12	3	78	40	2.20
79	17h2b	1	81	66	1	6	11	18	4	83	40	2.45
80	17h2b	–	72	59	1	6	16	23	4	86	50	2.46
81	17h2b	–	71	58	2	9	19	17	4	78	51	2.24

TABLE B-23
Supervisor-Graduate Agreement on Which Tasks Were Performed

Job Task Number	STS Number	Data for both N	Agreement			Disagreement				
			Both Yes	Both No	Total	Supervisor Yes, Graduate No	Supervisor No, Graduate Yes	Total	Percent Supervisor Yes	Percent Graduate Yes
1	3a	93	90	0	90	8	2	10	98	92
2	3b	93	94	0	94	4	2	6	98	96
3	3d5	94	79	3	82	12	6	18	91	85
4	3f	90	78	2	80	18	2	20	96	80
5	4a	94	68	1	69	7	24	31	75	92
6	4b	94	83	0	83	9	8	17	92	91
7	4d	92	64	8	72	13	15	28	77	79
8	4e	93	33	12	45	12	43	55	45	77
9	7d	92	83	2	85	11	4	15	94	87
10	9a	94	90	0	90	6	4	10	96	94
11	9a	89	91	1	92	6	2	8	97	93
12	9b	93	54	6	60	12	28	40	66	82
13	9c	94	82	3	85	5	10	15	87	92
14	9d	94	84	0	84	5	11	16	89	95
15	9g	94	84	0	84	9	7	16	93	91
16	9h	94	89	1	90	4	6	10	93	95
17	9h	94	90	0	90	5	5	10	95	95
18	13a1	90	34	31	65	9	26	35	43	60
19	13a1	93	34	29	63	8	29	37	42	63
20	13a2	93	87	1	88	6	6	12	93	93
21	13a2	92	79	2	81	5	14	19	84	93
22	13a3	92	7	63	70	3	27	30	10	34
23	13a3	92	3	65	68	4	28	32	7	31
24	13a5	93	6	54	60	2	38	40	8	44
25	13a5	93	4	62	66	3	31	34	7	35
26	14a2	89	9	52	61	4	35	39	13	44
27	14a2	93	13	44	57	9	34	43	22	47
28	14c2	93	1	60	61	3	36	39	4	37
29	14c2	92	4	59	63	4	33	37	8	37
30	14d2	93	20	34	54	9	37	46	29	57
31	14d2	93	27	25	52	9	39	48	36	63
32	15a1	89	44	31	75	12	13	25	56	57
33	15a1	93	45	31	76	10	14	24	55	59
34	15a2	93	43	33	76	8	16	24	51	59
35	15a2	93	42	32	74	10	16	26	52	58
36	15b2	93	56	26	82	8	10	18	64	66
37	15b3	93	46	27	73	8	19	27	54	65
38	15c1	93	55	25	80	4	16	20	59	71
39	15c2	93	52	25	77	4	19	23	56	71
40	16a2	92	4	51	55	9	36	45	13	40
41	16a2	92	11	43	54	7	39	46	18	50

continued

TABLE B-23 (continued)

Job Task Number	STS Number	Data for both N	Agreement			Disagreement				
			Both Yes	Both No	Total	Supervisor Yes, Graduate No	Supervisor No, Graduate Yes	Total	Percent Supervisor Yes	Percent Graduate Yes
42	16a2	94	11	47	58	5	37	42	16	48
43	16b2	94	39	22	61	13	26	39	52	65
44	16b2	94	41	19	60	14	26	40	55	67
45	16b2	94	38	22	60	12	28	40	50	66
46	16c2	94	47	20	67	16	17	33	63	64
47	16c2	94	46	18	64	18	18	36	64	64
48	16c2	94	39	24	63	14	23	37	53	62
49	16d2	93	29	30	59	17	24	41	46	53
50	16d2	93	35	30	65	12	23	35	47	58
51	16d2	93	26	34	60	14	26	40	40	52
52	16e2	94	6	57	63	4	33	37	10	39
53	16e2	94	7	54	61	4	35	39	11	42
54	16e2	93	6	55	61	2	37	39	8	43
55	17a2	88	50	14	64	23	13	34	73	63
56	17a2	94	59	14	73	13	14	27	72	73
57	17a2	93	55	14	69	14	17	31	69	72
58	17b2	94	19	34	53	10	37	47	29	56
59	17b2	94	28	22	50	14	36	50	42	64
60	17b2	94	24	33	57	8	35	43	32	59
61	17e2a	94	20	43	63	7	30	37	27	50
62	17e2a	93	19	43	62	8	30	38	27	49
63	17e2a	94	16	43	59	10	31	41	26	47
64	17e2b	94	18	40	58	11	31	42	29	49
65	17e2b	94	18	40	58	12	30	42	30	48
66	17e2b	94	17	44	61	10	29	39	27	46
67	17f2a	93	56	18	74	13	13	26	69	69
68	17f2a	94	55	18	73	13	14	27	68	69
69	17f2a	92	46	20	66	14	20	34	60	66
70	17f2b	94	38	30	68	12	20	32	50	58
71	17f2b	94	37	27	64	11	25	36	48	62
72	17f2b	94	28	30	58	12	30	42	40	58
73	17f2c	94	12	49	61	3	36	39	15	48
74	17f2c	94	11	48	59	3	38	41	12	47
75	17f2c	94	9	50	59	3	38	41	12	47
76	17f2d	94	26	33	59	14	27	41	40	53
77	17f2d	94	26	34	60	13	27	40	39	53
78	17f2d	94	21	40	61	11	28	39	32	49
79	17h2b	93	14	46	60	16	24	40	30	38
80	17h2b	94	21	39	60	18	22	40	39	43
81	17h2b	94	21	41	62	18	20	38	39	41

TABLE B-24
Reported Reasons for Nonperformance of Tasks

Based on 122 Supervisor Reports

Job Task Number	Number Not Performing	Not Yet But Will Be Required	Not Relevant At Work Site	Not Allowed At Work Site	Not Required Hardware	Not Required Other
1	2	2	–	–	–	–
2	2	2	–	–	–	–
3	13	11	2	–	–	–
4	6	6	–	–	–	–
5	28	25	1	1	–	–
6	9	8	1	–	–	–
7	30	21	7	1	1	–
8	64	54	7	1	–	–
9	9	9	1	–	–	–
10	3	3	–	–	–	–
11	3	3	–	–	–	–
12	47	35	5	–	6	2
13	19	17	2	–	–	1
14	14	13	1	–	–	–
15	11	9	2	–	–	–
16	8	6	2	–	–	–
17	6	5	1	–	–	–
18	69	54	6	1	3	2
19	73	55	7	1	4	2
20	10	7	2	–	–	–
21	17	10	5	1	–	1
22	110	58	29	2	15	3
23	113	60	30	2	16	3
24	114	56	28	4	21	3
25	114	57	28	4	21	3
26	102	67	18	4	7	4
27	98	64	18	4	7	3
28	116	38	43	6	24	4
29	112	33	44	6	24	4
30	91	59	18	2	7	4
31	82	53	16	2	7	4
32	54	27	16	1	4	4
33	57	30	16	1	5	4
34	60	31	20	1	4	3
35	59	30	20	1	4	3
36	45	24	13	1	3	3
37	56	34	14	1	3	3
38	49	26	14	1	4	3
39	52	29	14	1	4	3
40	101	32	46	2	18	2
41	98	29	45	2	18	2

continued

TABLE B-24 (continued)

Job Task Number	Number Not Performing	Not Yet But Will Be Required	Not Relevant At Work Site	Not Allowed At Work Site	Not Required Hardware	Not Required Other
42	102	36	47	1	17	1
43	60	50	6	–	1	1
44	61	52	6	–	1	1
45	65	55	6	1	1	1
46	47	40	6	–	–	1
47	50	43	6	–	– –	1
48	59	52	6	–	–	1
49	67	57	7	–	2	1
50	67	57	7	–	2	1
51	76	63	9	–	2	2
52	109	35	52	1	16	4
53	109	33	53	2	16	4
54	111	36	53	2	16	3
55	32	26	5	–	–	1
56	36	28	7	–	–	1
57	38	31	6	–	–	1
58	84	75	8	–	–	1
59	74	64	9	–	–	1
60	82	72	9	–	–	1
61	87	71	11	1	3	1
62	87	68	14	1	3	1
63	88	71	11	1	3	1
64	85	72	10	–	2	1
65	84	71	10	–	2	1
66	85	72	10	–	2	1
67	43	35	6	–	–	1
68	42	34	6	–	–	1
69	52	43	8	–	1	1
70	63	43	14	–	4	1
71	64	43	15	–	4	1
72	74	51	17	–	4	1
73	105	51	41	–	10	1
74	106	51	42	–	10	1
75	108	54	41	–	10	1
76	75	59	13	–	2	1
77	77	61	13	–	2	1
78	82	65	14	–	2	1
79	81	58	18	3	1	1
80	72	59	11	–	1	1
81	71	58	11	–	1	1

TABLE B-25
Basis for Supervisor Proficiency Ratings

Job Task Number	N	Percent of Supervisors Reporting		
		Own Task Observations	Other Task Observations	General Impressions
1	116	78	16	5
2	116	85	11	3
3	105	77	18	5
4	106	79	16	5
5	89	75	18	7
6	108	78	18	5
7	93	65	24	5
8	55	69	25	5
9	106	86	11	3
10	114	82	14	4
11	110	86	9	5
12	70	80	16	4
13	99	79	19	2
14	103	79	19	2
15	105	78	18	4
16	108	78	18	5
17	111	77	20	4
18	47	66	34	0
19	47	70	30	0
20	106	76	22	2
21	101	78	19	3
22	9	78	22	0
23	6	83	17	0
24	7	57	43	0
25	6	50	50	0
26	14	64	36	0
27	22	77	23	0
28	5	80	20	0
29	8	88	12	0
30	29	66	34	0
31	38	68	32	0
32	60	62	38	0
33	62	60	40	0
34	59	84	16	0
35	60	70	30	0
36	74	69	31	0
37	64	66	34	0
38	70	67	33	0
39	67	67	33	0
40	17	88	12	0
41	20	85	15	0

continued

TABLE B-25 (continued)

Job Task Number	N	Percent of Supervisors Reporting		
		Own Task Observations	Other Task Observations	General Impressions
42	17	71	29	0
43	60	58	42	0
44	58	59	41	0
45	54	61	39	0
46	72	60	39	1
47	68	54	46	0
48	60	58	42	0
49	49	53	47	0
50	50	54	46	0
51	43	49	51	0
52	12	83	17	0
53	12	75	25	0
54	9	67	33	0
55	76	67	30	3
56	81	65	32	3
57	78	63	33	4
58	38	66	32	2
59	48	58	42	0
60	40	63	37	0
61	34	65	35	0
62	34	68	32	0
63	33	67	33	0
64	37	68	32	0
65	38	66	34	0
66	37	70	30	0
67	77	68	30	2
68	79	67	30	3
69	65	68	28	4
70	57	67	32	1
71	56	64	34	2
72	46	70	28	2
73	17	71	29	0
74	16	63	37	0
75	14	71	29	0
76	45	60	36	4
77	43	60	35	5
78	49	47	29	4
79	38	61	39	0
80	48	58	40	2
81	49	59	39	2

TABLE B-26
Task Proficiency Ratings as a Function of the Basis for the Rating

Task Number	Basis					
	General Impressions		Own Observations on Task		Other Observations on Task	
	N	Mean*	N	Mean*	N	Mean*
1	6	4.17	91	3.98	19	3.90
2	4	4.00	98	4.10	13	4.08
3	5	3.80	81	4.07	19	3.84
4	5	4.00	83	4.05	17	4.00
5	6	3.50	67	3.45	16	3.75
6	5	3.80	84	3.51	19	3.68
7	5	3.40	60	3.63	22	3.78
8	3	3.67	38	3.42	14	3.50
9	3	3.67	91	3.68	12	3.50
10	4	4.00	92	3.99	16	3.88
11	4	4.50	94	4.02	10	3.90
12	2	4.00	56	3.64	11	3.64
13	2	4.00	78	3.92	19	3.90
14	2	4.00	81	3.80	20	3.65
15	4	3.75	82	3.94	19	3.84
16	5	3.60	84	3.77	19	3.42
17	4	3.75	85	3.97	22	3.82
18	0	–	31	3.42	16	3.25
19	0	–	33	3.42	14	3.43
20	2	3.50	81	3.91	23	3.78
21	3	3.33	79	3.91	19	3.79
22	0	–	7	4.14	2	3.00
23	0	–	5	4.20	1	3.00
24	0	–	4	3.75	3	2.67
25	0	–	3	3.33	3	3.67
26	0	–	9	3.22	5	3.60
27	0	–	17	2.88	5	3.20
28	0	–	4	3.25	1	4.00
29	0	–	7	2.87	1	4.00
30	0	–	19	3.05	10	3.10
31	0	–	26	3.12	12	3.17
32	0	–	37	4.03	23	3.56
33	0	–	37	3.95	24	3.58
34	0	–	42	3.98	17	3.59
35	0	–	42	3.98	18	3.56
36	0	–	51	4.00	23	3.65
37	0	–	42	3.86	22	3.64
38	0	–	47	4.09	23	3.61
39	0	–	45	4.04	22	3.64
40	0	–	14	3.14	2	3.50
41	0	–	16	3.38	3	3.00

continued

TABLE B-26 (continued)

Task Number	Basis					
	General Impressions		Own Observations on Task		Other Observations on Task	
	N	Mean*	N	Mean*	N	Mean*
42	0	–	12	3.00	5	2.80
43	0	–	35	3.26	25	2.88
44	0	–	34	3.18	24	3.21
45	0	–	33	3.06	21	2.91
46	1	3.00	42	3.71	28	3.25
47	0	–	37	3.70	31	3.29
48	0	–	35	3.34	25	3.12
49	0	–	26	3.77	23	3.35
50	0	–	27	3.74	23	3.35
51	0	–	21	3.71	22	3.16
52	0	–	10	3.00	2	2.50
53	0	–	9	3.11	3	3.00
54	0	–	6	2.83	3	2.00
55	2	3.50	50	3.84	23	3.61
56	2	4.00	53	3.83	26	3.69
57	3	3.67	49	3.57	26	3.35
58	1	4.00	25	3.60	12	3.00
59	0	–	28	3.57	20	3.20
60	0	–	25	3.28	15	2.93
61	0	–	22	3.50	12	2.83
62	0	–	23	3.48	11	3.18
63	0	–	22	3.27	11	2.91
64	0	–	25	3.68	12	3.33
65	0	–	25	3.68	13	3.39
66	0	–	26	3.27	11	3.09
67	2	3.50	52	3.90	23	3.52
68	2	3.50	53	3.83	24	3.58
69	3	2.99	44	3.59	18	3.50
70	1	4.00	38	3.79	18	3.44
71	1	4.00	36	3.78	19	3.36
72	1	4.00	31	3.81	13	3.15
73	0	–	12	3.50	5	3.60
74	0	–	10	3.30	6	3.67
75	0	–	10	3.70	4	3.75
76	2	3.50	27	3.63	16	3.38
77	2	3.50	26	3.60	15	3.27
78	2	3.50	23	3.30	14	3.07
79	0	–	23	3.61	15	3.27
80	1	2.00	28	3.64	19	3.26
81	1	2.00	29	3.41	19	3.05
All Tasks	**35**	**3.63**	**81**	**3.61**	**81**	**3.40**

* Because of the manner in which the means were calculated, 1 must be subtracted from all of them to make them comparable with other ratings.

TABLE B-27
Training Standard Levels for Selected STS Job Elements

STS Job Element		Not Rated	Supervisor Ratings (n=42)									
			Present Level		If Not OK, It Should Be							
Number	Level		OK	Not OK	1a	1b	1c	2a	2b	2c	3b	3c
3a	2b	0	40	2	–	–	–	–	–	–	–	2
3b	2b	0	40	2	–	–	–	–	–	–	–	2
3d1	2c/c	0	41	1	–	–	–	–	–	–	–	1
3d2	2c/c	1	39	2	–	–	–	–	–	–	–	2
3d3	2c/c	1	39	2	–	–	–	–	–	–	–	2
3d4	2c/c	1	39	2	–	–	–	–	–	–	–	2
3d5	2b	0	39	3	–	–	–	–	–	1	1	1
3d6	2c/c	1	38	3	–	–	–	–	–	–	1	2
3e	2b/b	1	39	2	–	–	–	–	–	–	1	1
3f	2b	1	39	2	–	–	–	–	–	–	1	1
4a	2b	0	41	1	–	1	–	–	–	–	–	–
4b	2b	0	42	0	–	–	–	–	–	–	–	–
4c	2b/b	0	41	1	–	–	–	–	–	–	–	–
4d	2b	0	41	1	–	1	–	–	–	–	–	–
4e	2b	0	37	5	1	3	–	–	–	–	–	–
7d	2b	0	42	0	–	–	–	–	–	–	–	–
9a	2b	0	40	2	–	–	–	–	–	1	–	1
9b	2b	0	40	2	–	1	–	–	–	–	–	1
9c	2b	0	40	2	–	–	–	–	–	–	–	2
9d	2b	0	41	1	–	–	–	–	–	–	–	1
9g	1b	0	30	12	–	–	–	1	8	1	1	1
9h	2b	0	42	0	–	–	–	–	–	–	–	–
13a1	2b/1a	0	41	1	–	–	–	–	–	–	–	1
13a2	2b	0	39	3	–	–	–	–	–	1	–	2
13a3	2b	3	35	4	2	1	–	–	–	–	–	–
13a4	2b	4	33	5	3	1	–	–	–	–	–	–
13a5	1b	4	34	4	2	–	–	–	1	–	–	–
13a8	1b/b	4	34	4	1	1	–	–	1	–	–	–
13a9	2b/b	3	37	2	1	–	–	–	–	–	–	–
14a2	2b	1	37	4	–	2	–	–	–	–	–	–
14b2	2b	2	36	4	–	2	–	–	–	–	–	–
14c2	1b	1	37	4	–	–	–	1	1	–	–	–
14d2	1b	1	36	5	–	–	–	1	2	–	–	–
15a1	2b	1	40	1	–	1	–	–	–	–	–	–
15a2	2b	2	38	2	–	1	–	–	–	–	–	–
15b2	1b	1	37	4	–	–	–	–	4	–	–	–
15b3	1b/b	1	39	2	–	–	–	–	2	–	–	–
15c1	1b	1	38	3	–	–	–	–	3	–	–	–
15c2	1b	1	40	1	–	–	–	–	1	–	–	–

continued

TABLE B-27 (continued)

STS Job Element		Not Rated	Supervisor Ratings (n=42)									
			Present Level		If Not OK, It Should Be*							
Number	Level		OK	Not OK	1a	1b	1c	2a	2b	2c	3b	3c
16a2	2b	2	37	3	–	1	1	–	–	1	–	–
16b2	2b	0	40	2	–	1	–	–	–	1	–	–
16c2	2b	0	41	1	–	–	–	–	–	1	–	–
16d2	2b	0	41	1	–	–	–	–	–	1	–	–
16e2a	1b	2	35	5	–	–	–	–	3	1	–	–
17a2	2b	0	40	2	–	–	–	–	–	1	–	1
17b2	2b	0	40	2	–	1	–	–	–	1	–	–
17c2	2b	0	40	2	–	1	–	–	–	1	–	–
17d2	2b	1	39	2	–	1	–	–	–	1	–	–
17e2a	2b	0	40	2	–	1	–	–	–	1	–	–
17e2b	2b	0	40	2	–	1	–	–	–	1	–	–
17f2a	2b	0	41	1	–	–	–	–	–	1	–	–
17f2b	2b	1	40	1	–	–	–	–	–	1	–	–
17f2c	2b	2	38	2	1	–	–	–	–	1	–	–
17f2d	2b	1	38	3	1	1	–	–	–	1	–	–
17f2e	1b/x	0	38	4	–	–	–	–	3	1	–	–
17g2	1b/x	0	38	4	–	–	–	–	3	1	–	–
17h2a	1b/a	0	38	4	–	–	–	–	3	1	–	–
17h2b	2b	2	38	2	–	–	–	–	1	1	–	–
17i2	1b/a	1	38	3	–	–	–	–	2	1	–	–

* "Should Be" responses do not always equal "Not OK" responses due to missing data.

TABLE B-28
Criticality of Selected STS Job Elements

STS Element Number	Number of Supervisor Ratings (n=45)					Overall Criticality	
	Not Relevant	Limited Relevant	Important	Critical	Not Rated	Mean	S.D.
3a	0	1	13	31	0	2.7	.52
3b	0	1	16	28	0	2.6	.53
3d1	1	1	6	37	0	2.8	.61
3d2	0	2	10	33	0	2.7	.56
3d3	4	4	13	23	1	2.3	.96
3d4	1	2	15	26	1	2.5	.70
3d5	0	1	9	35	0	2.8	.48
3d6	0	3	10	32	0	2.6	.61
3e	0	3	16	25	1	2.5	.63
3f	0	0	15	27	3	2.6	.48
All 3's	**6**	**18**	**123**	**297**	**6**	**2.6**	**4.5**
4a	0	7	30	8	0	2.0	.58
4b	0	1	29	15	0	2.3	.51
4c	0	5	30	10	0	2.1	.57
4d	0	2	30	13	0	2.2	.53
4e	2	14	22	7	0	1.8	.77
All 4's	**2**	**29**	**141**	**53**	**0**	**2.1**	**.47**
7d	0	5	28	12	0	2.2	.60
9a	0	1	26	18	0	2.3	.53
9b	0	4	26	15	0	2.2	.61
9c	0	1	24	20	0	2.4	.54
9d	0	3	26	16	0	2.3	.59
9g	0	2	26	17	0	2.3	.56
9h	0	3	26	16	0	2.3	.59
All 9's	**0**	**14**	**154**	**102**	**0**	**2.3**	**.46**
13a1	3	8	24	9	1	1.9	.81
13a2	0	1	25	19	0	2.4	.54
13a3	9	15	15	5	1	1.4	.94
13a4	18	17	6	2	2	.8	.85
13a5	14	16	10	4	1	1.1	.96
13a8	5	18	16	6	0	1.5	.87
13a9	5	21	12	7	0	1.5	.89
All 13's	**54**	**96**	**108**	**52**	**5**	**1.5**	**.67**

continued

TABLE B-28 (continued)

STS Element Number	Number of Supervisor Ratings (n-45)					Overall Criticality	
	Not Relevant	Limited Relevance	Important	Critical	Not Rated	Mean	S.D.
14a2	4	10	22	8	1	1.8	.86
14b2	5	9	26	5	0	1.7	.82
14c2	20	15	8	1	1	.8	.83
14d2	4	10	22	8	1	1.8	.85
All 14's	**33**	**44**	**78**	**22**	**3**	**1.5**	**.68**
15a1	3	6	24	12	0	2.0	.83
15a2	7	5	20	12	1	1.8	1.00
15b2	1	4	29	11	0	2.1	.65
15b3	1	5	31	8	0	2.0	.62
15c1	1	5	28	11	0	2.1	.67
15c2	1	7	27	10	0	2.0	.69
All 15's	**14**	**32**	**159**	**64**	**1**	**2.0**	**.63**
16a2	13	16	5	11	0	1.3	1.14
16b2	1	1	17	26	0	2.5	.66
16c2	0	11	27	17	0	2.4	.53
16d2	0	3	26	16	0	2.3	.59
16e2a	13	12	13	7	0	1.3	1.06
All 16's	**27**	**33**	**88**	**77**	**0**	**2.0**	**.59**
17a2	0	0	29	16	0	2.4	.48
17b2	0	0	18	27	0	2.6	.50
17c2	3	0	20	22	0	2.4	.80
17d2	6	9	12	18	0	1.9	1.07
17e2a	1	1	26	17	0	2.3	.63
17e2b	5	1	20	19	0	2.2	.94
17f2a	0	0	17	28	0	2.6	.49
17f2b	3	4	14	24	0	2.3	.90
17f2c	9	6	18	12	0	1.7	1.07
17f2d	4	3	18	20	0	2.2	.92
17f2e	2	2	23	17	1	2.3	.75
17g2	3	3	21	18	0	2.2	.84
17h2a	0	1	25	19	0	2.4	.54
17h2b	2	2	24	17	0	2.2	.74
17i2	2	3	28	12	0	2.1	.71
All 17's	**40**	**35**	**313**	**286**	**1**	**2.3**	**.48**

TABLE B-29

Impact of Training Deficiency of Selected STS Job Elements

Weights used for impact score shown in parentheses

STS Element Number	Supervisor Ratings/Type of Impact								Average Weighted Impact Score
	Task Not Required (0)	No Impact (1)	No Upgrading (2)	Delayed Upgrading (2)	Time of Others (2)	System Reliability (2)	System Down Time (2)	Production Delays (2)	
3a	0	4	8	8	19	13	7	8	1.94
3b	0	4	7	9	20	10	6	5	1.93
3d1	1	5	7	9	17	9	7	5	1.88
3d2	1	6	6	11	17	8	4	4	1.86
3d3	16	2	5	3	10	5	4	4	1.31
3d4	4	7	7	7	14	7	4	4	1.72
3d5	5	10	7	15	11	7	5	5	1.89
3d6	3	6	8	8	16	8	6	5	1.80
3e	0	10	4	9	18	8	4	5	1.83
3f	0	6	5	7	20	12	11	8	1.91
All 3's	**26**	**55**	**67**	**78**	**166**	**91**	**60**	**53**	**1.82**
4a	2	4	5	11	21	6	4	4	1.86
4b	0	3	8	11	20	7	4	5	1.86
4c	2	4	5	11	20	7	4	5	1.86
4d	2	2	5	12	21	6	5	6	1.90
4e	3	5	3	11	20	5	4	4	1.80
All 4's	**9**	**18**	**26**	**56**	**102**	**31**	**21**	**24**	**1.88**
7d	1	4	5	9	24	7	2	3	1.89
9a	1	2	7	11	20	12	7	8	1.94
9b	4	2	4	11	16	13	5	5	1.83
9c	1	4	7	9	18	14	6	5	1.91
9d	1	3	7	10	20	14	7	7	1.93
9g	1	4	7	9	21	14	6	7	1.91
9h	1	3	8	9	24	10	5	6	1.92
All 9's	**9**	**18**	**40**	**59**	**119**	**77**	**36**	**38**	**1.91**
13a1	3	6	7	9	19	5	4	4	1.79
13a2	1	4	7	12	17	11	7	7	1.91
13a3	11	9	2	6	11	5	3	2	1.37
13a4	22	8	0	2	3	1	1	2	.67
13a5	13	10	2	5	8	2	2	3	1.20
13a8	14	9	2	3	8	3	2	2	1.14
13a9	7	12	1	7	13	4	2	2	1.46
All 13's	**71**	**58**	**21**	**44**	**79**	**31**	**21**	**22**	**1.42**

continued

TABLE 29 (continued)

STS Element Number	Task Not Required (0)	Supervisor Ratings/Type of Impact							Average Weighted Impact Score
		No Impact (1)	No Upgrading (2)	Delayed Upgrading (2)	Time of Others (2)	System Reliability (2)	System Down Time (2)	Production Delays (2)	
14a2	6	8	3	10	14	8	3	3	1.64
14b2	5	9	2	9	15	7	4	3	1.65
14c2	20	6	2	4	5	3	2	2	.95
14d2	2	10	2	10	17	7	4	3	1.75
All 14's	**33**	**33**	**9**	**33**	**51**	**25**	**13**	**11**	**1.52**
15a1	3	3	6	8	22	9	7	8	1.86
15a2	3	2	4	11	23	8	9	7	1.88
15b2	1	2	6	10	24	9	8	7	1.94
15b3	1	2	5	10	26	10	7	6	1.94
15c1	1	2	6	9	24	9	6	5	1.94
15c2	1	2	6	9	25	9	5	5	1.94
All 15's	**10**	**13**	**33**	**57**	**144**	**54**	**42**	**38**	**1.92**
16a2	15	7	5	6	5	2	4	3	1.21
16b2	2	7	7	11	17	9	9	8	1.84
16c2	2	6	8	11	18	9	8	8	1.86
16d2	2	6	6	12	18	8	8	7	1.85
16e2a	15	7	3	6	5	3	5	4	1.23
All 16's	**36**	**33**	**29**	**46**	**63**	**31**	**34**	**30**	**1.65**
17a2	2	5	8	12	16	8	8	6	1.86
17b2	2	6	5	13	18	9	8	6	1.85
17c2	2	5	7	13	17	9	8	7	1.88
17d2	11	6	4	8	9	4	3	2	1.40
17e2a	2	6	3	14	20	9	7	7	1.85
17e2b	4	5	3	13	19	9	7	7	1.81
17f2a	2	4	4	15	20	9	7	8	1.88
17f2b	6	4	3	12	17	8	5	7	1.74
17f2c	12	5	2	8	12	6	5	6	1.48
17f2d	2	5	3	13	21	8	7	8	1.87
17f2e	2	7	3	13	20	9	7	8	1.84
17g2	7	7	1	10	15	7	6	6	1.64
17h2a	2	8	4	11	18	9	6	7	1.82
17h2b	2	5	3	11	21	9	6	8	1.86
17i2	5	4	2	12	19	8	5	6	1.77
All 17's	**63**	**82**	**55**	**178**	**262**	**121**	**95**	**99**	**1.78**

TABLE B-30
Hours of Instruction versus Task Criticality

Task Criticality	Hours of Instruction			
	Less than 1 (0)	More than 1, Less than 2 (1)	Between 2 and 6 (2-6)	Seven and Over (7-50)
Low (0.00–1.8)	13a4, 14c2, 4e	13a9, 16e2a, 17f2c, 15a2	13a8, 14b2, 14a2	14d2, 16a2, 13a5, 13a3
Low Middle (1.90–2.2)	17g2, 13a1, 17f2d, 4d, 15c1, 15c2	17i2, 15a1	4c, 17d2, 17e2b, 17h2b, 15b3, 15b2	4a, 7d, 9b
High Middle (2.3–2.4)	3d3, 17f2e, 16c2	17f2b, 9d, 17a2, 9c, 9g	17c2, 17h2a, 17e2a, 16d2	4b, 9h, 9a 13a2
High (2.5–2.8)	3d1, 3d2, 3d4, 3d6, 3e	17f2a	17b2, 3f	16b2, 3a, 3b, 3d5

TABLE B-31
Hours of Instruction versus Impact of Training Deficiency

Impact of Training Deficiency	Hours of Instruction			
	Less than 1 (0)	More than 1, Less than 2 (1)	Between 2 and 6 (2-6)	Seven and Over (7-50)
Low (0.00–1.69)	14c2, 17g2 13a4, 3d3	16e2a, 17f2c, 13a9	13a8, 14b2, 17d2, 14a2	13a5, 16a2, 13a3
Low Middle (1.70–1.84)	17f2e, 4e, 3e, 13a1, 3d4, 3d6	17i2, 17f2b	17h2a, 17e2b	14d2, 9b, 16b2
High Middle (1.85–1.86)	16c2, 4d, 3d2	17a2, 15a1,	17b2, 16d2, 17e2a, 17h2b, 4c	4a, 4b
High (1.87–1.94)	15c1, 15c2, 17f2d, 3d1	9g, 9d, 9c, 17f2a, 15a2	15b2, 15b3, 17c2, 3f	7d, 9h, 9a, 3a, 3b, 3d5, 13a2

TABLE B-32
Hours of Instruction versus STS Level

STS Level	Hours of Instruction			
	Less than 1 (0)	More than 1, Less than 2 (1)	Between 2 and 6 (2-6)	Seven and Over (7-50)
1b/	17g2, 17f2e	17i2	13a8, 17h2a, 15b3	–
1b	15c1, 15c2, 14c2	9g, 16e2a	15b2	14d2, 13a5
2b/	3e, 13a1	13a9	4c	–
2b	13a4, 17f2d, 4e, 16c2, 4d	9d, 17f2b, 9c, 17f2c, 17a2, 15a1, 17f2a, 15a2	14b2, 17d2, 17c2, 17b2, 17e2b, 16d2, 3f, 17e2a, 17h2b, 14a2	4a, 4b, 7d, 9h, 9a, 3a, 3b, 3d5, 9b, 13a2, 16b2, 16a2, 13a3
2c/	3d3, 3d2, 3d4, 3d6, 3d2, 3d1			

TABLE B-33
Hours of Instruction versus Overall Proficiency

	Hours of Instruction			
	Less than 1 (0)	More than 1 Less than 2 (1)	Between 2 and 6 (2-6)	Seven and Over (7-50)
Low (1.89–2.37)	–	16e2a	14a2, 17e2a, 17b2	16a2, 14d2, 16b2
Low Middle (2.38–2.49)	14c2, 4e, 13a1, 16c2, 17f2d	–	17e2b, 17h2b	13a5
High Middle (2.50–2.81)	4d	17f2c, 17f2b, 17a2, 9d, 17f2a	16d2, 15b3	9b, 4a, 4b, 7d
High (2.82–2.83)	15c1, 15c2	15a1, 15a2, 9c, 9g	15b2, 3f	13a3, 9h, 9a, 13a2, 3a, 3b, 3d5
Not Measured, NA	13a4, 3d3, 17f2e, 4d, 3d6, 3e, 3d2, 3d1	13a9, 17i2	13a8, 14b2, 17d2, 17h2a, 4c, 17c2	–

TABLE B-34

Hours of Instruction versus Number Who Did and Will Not Perform

Number Who Did and Will Not Perform	Hours of Instruction			
	Less than 1 (0)	More than 1, Less than 2 (1)	Between 2 and 6 (2-6)	Seven and Over (7-50)
High (30–84)	14c2	16e2a, 17f2c, 15a1, 15a2	14a2	16a2, 14d2, 13a5, 13a3
High Middle (16–29)	13a1, 17f2d, 15c1, 15c2	17f2b	17e2a, 17h2b, 15b3, 15b2	16b2
Low Middle (8–15)	4e, 16c2, 4d	17a2, 17f2a	17b2, 17e2b, 16d2, 3f	9b, 13a2
Low (1–7)	–	9d, 9c, 9g	–	4a, 4b, 7d, 9h, 9a, 3a, 3b, 3d5
Not Measured, NA	13a4, 17g2, 3d3, 17f2e, 3d4, 3d6, 3e, 3d2, 3d1	13a9, 17i2	13a8, 14b2, 17 17d2, 17h2a, 4c, 17c2	–

TABLE B-35
Hours of Instruction versus Graduate Reports of Training Adequacy

Training Adequacy	Hours of Instruction			
	Less than 1 (0)	More than 1, Less than 2 (1)	Between 2 and 6 (2-6)	Seven and Over (7-50)
Low (1.6–1.8)	14c2	16e2a, 17f2c	17e2a, 17e2b, 17h2b, 16d2	14d2, 16a2, 13a3
Low Middle (1.9)	4e, 13a1, 17f2d, 4d	17f2b	14a2, 17b2	16b2, 13a5
High Middle (2.0–2.1)	16c3, 15c1, 15c2	9d, 17a2, 17f2a, 9c, 9g, 15a2	15b3	4a, 4b, 7d, 9b, 9h
High (2.2–2.3)	–	15a1	3f, 15b2	3a, 3b, 3d5, 9a 13a2
Not Measured, NA	3d1, 3d2, 3d4, 3d6, 3e, 13a4, 17f2e, 17g2	13a9, 17i2	4c, 13a8, 14b2, 17c2, 17d2, 17h2a	–

TABLE B-36
Overall Proficiency versus STS Level

	Overall Proficiency				
	Not Measured, NA	Low (1.89–2.37)	Low Middle (2.38–2.49)	High Middle (2.50–2.81)	High (2.82 and Over)
1b/	13a8, 17f2e, 17g2, 17h2a, 17i2	–	–	15b3	–
1b	–	16e2a, 14d2	14c2, 13a5	–	15c1, 15c2, 15b2, 9g
2b/	13a9, 4c, 3e	–	13a1	–	–
2b	13a4, 14b2, 17d2, 17c2	14a2, 16a2, 17e2a, 16b2, 17b2	4e, 17e2b, 17h2b, 17f2d, 16c2	17f2c, 17a2, 9b, 16d2, 4d, 4b, 4a, 9d, 7d, 17f2a, 17f2b	13a3, 15a1, 15a2, 9c, 3f, 9h, 3a, 9a, 3b, 13a2, 3d5
2c	3d3, 3d4, 3d6, 3d2, 3d1				

TABLE B-37
Overall Proficiency versus Task Criticality

Criticality	Overall Proficiency				
	Not Measured, NA	Low (1.89–2.37)	Low Middle (2.38–2.49)	High Middle (2.50–2.81)	High (2.82 and over)
Low (0.00–1.8)	13a4, 13a9, 13a8, 14b2	16e2a, 14a2, 14d2, 16a2	14c2, 4e, 13a5	17f2c	13a3, 15a2
Low Middle (1.9–2.2)	17g2, 17i2, 4c, 17d2	–	13a1, 17f2d, 17e2b, 17h2b	4d, 15b3, 4a, 7d, 9b	15a1, 15c1, 15c2, 15b2
High Middle (2.3–2.4)	3d3, 17f2e, 17h2a	17e2a	16c2	17f2b, 9d, 17a2, 16d2, 4b	9c, 9g, 9h, 9a, 13a2
High (2.5–2.8)	3d1, 3d2, 3d4, 3d6, 3e	17b2, 16b2	–	17f2a	3f, 3a, 3b 3d5
Not Measured, NA	–	–	–	–	–

TABLE B-38
Overall Proficiency versus Impact of Training Deficiency

Impact	Overall Proficiency				
	Not Measured	Low (1.89–2.37)	Low Middle (2.38–2.49)	High Middle (2.50–2.81)	High (2.82 and over)
Low (0.00–1.69)	13a4, 17g2, 3d3, 14b2, 13a9, 17d2, 13a8	16e2a, 14a2, 16a2	14c2, 13a5	17f2c	13a3
Low Middle (1.70–1.84)	17f2e, 3d4, 3d6, 3e, 17i2, 17h2a	14d2, 16b2	4e, 13a1, 17e2b	17f2b, 9b	–
High Middle (1.85–1.86)	3d2, 4c	17e2a, 17b2	16c2, 17h2b	4d, 17a2, 16d2, 4a, 4b	15a1
High (1.87–1.94)	3b1, 17c2	–	17f2b	9d, 17f2a, 15b3, 7d	15c1, 15c2, 15a2, 9c, 9g, 15b2, 3f, 9h, 9a, 13a2, 3a, 3b, 3d5
Not Measured	–	–	–	–	–

TABLE B-39
Overall Proficiency versus Graduate Reports of Training Adequacy

Training Adequacy	Overall Proficiency				
	Not Measured NA	Low (1.89–2.37)	Low Middle (2.38–2.49)	High Middle (2.50–2.81)	High (2.82 and Over)
Low (1.6–1.8)	–	14d2, 16a2, 16e2a, 17e2a	14c2, 17e2b, 17h2b	16d2, 17f2c	13a3
Low Middle (1.9)	–	14a2, 16b2, 17b2	4e, 13a1, 13a5, 17f2d	4d, 17f2b	–
High Middle (2.0–2.1)	–	–	16c2	4a, 4b, 7d, 9b, 15b3, 17a2, 17f2a, 9d	9c, 9g, 9h, 15a2, 15c1, 15c2
High (2.2–2.3)	–	–	–	–	15a1, 3a, 3b, 3d5, 3f, 9a, 13a2, 15b2
Not Measured	3d1, 3d2, 3d3, 3d4, 3d6, 3e, 4c, 13a4, 13a8, 13a9, 14b2, 17c2, 17d2, 17f2e, 17g2, 17h2a, 17i2				

TABLE B-40
Task Criticality versus Impact of Training Deficiency

Impact	Task Criticality			
	Low (0.0–1.8)	Low Middle (1.9–2.2)	High Middle (2.3–2.4)	High (2.5–2.8)
Low (0.0–1.69)	14c2, 14b2, 13a4, 14a2, 16e2a, 13a5, 17f2c, 16a2, 13a9, 13a3, 13a8	17g2, 17d2	3d3	–
Low Middle (1.70–1.84)	4e, 14d2	13a1, 17i2, 17e2b, 9b	17f2e, 17f2b 17h2a	3e, 3d4, 3d6, 16b2
High Middle (1.85–1.86)	–	4d, 15a1, 17h2b, 4c, 4a	16c2, 17a2, 16d2, 17e2a, 4b	3d2, 17b2
High (1.87–1.94)	15a2	15c1, 15c2, 17f2d, 15b2, 15b3, 7d	9g, 13a2, 9d 9c, 17c2, 9h, 9a	3d1, 17f2a, 3f, 3a, 3b, 3d5

TABLE 41
Summary of Task Characteristics

STS Item Number	STS Level	Hours of Instruction	Impact of Training Deficiency	Task Criticality	Overall Proficiency	Tasks Not Performed	Training Adequacy	Hours of Instruction versus: Criticality	Impact	STS Level	Overall Proficiency	Tasks Not Performed	Training Adequacy	Overall Proficiency versus: Criticality	Impact	STS Level	Training Adequacy	Criticality versus Impact
3a	2b	50	1.94	2.7	2.97	1	2.3	0	0	0	0	0	0	0	0	0	0	0
3b	2b	21	1.93	2.6	3.09	2	2.2	0	0	0	0	0	0	0	0	0	0	0
3d1	2c/	0	1.88	2.8	NA	NA	NA	−3	−3	−4	NA	NA	NA	NA	NA	NA	NA	0
3d2	2c/	0	1.86	2.7	NA	NA	NA	−3	−2	−4	NA	NA	NA	NA	NA	NA	NA	+1
3d3	2c/	0	1.31	2.3	NA	NA	NA	−2	0	−4	NA	NA	NA	NA	NA	NA	NA	+2
3d4	2c/	0	1.72	2.5	NA	NA	NA	−3	−1	−4	NA	NA	NA	NA	NA	NA	NA	+2
3d5	2b	35	2.89	2.8	3.02	3	2.2	0	0	0	0	0	0	0	0	0	0	0
3d6	2c/	0	1.80	2.6	NA	NA	NA	−3	−1	−4	NA	NA	NA	NA	NA	NA	NA	+2
3e	2b/	0	1.83	2.5	NA	NA	NA	−3	−1	−2	NA	NA	NA	NA	NA	NA	NA	+2
3f	2b	6	1.91	2.6	3.03	8	2.2	−1	−1	−1	−1	0	−1	0	0	0	0	0
4a	2b	8	1.86	2.0	2.50	5	2.0	+2	+1	0	+1	0	+1	+1	0	−1	0	−1
4b	2b	24	1.86	2.3	2.59	2	2.1	+1	+1	0	+1	0	+1	0	0	−1	0	0
4c	2b/	2	1.86	2.1	NA	NA	NA	+1	0	0	NA	NA	NA	NA	NA	NA	NA	−1
4d	2b	0	1.86	2.2	2.65	12	1.9	−1	−2	−3	−2	−2	−1	+1	0	−1	+1	−1
4e	2b	0	1.80	1.8	2.45	12	1.9	0	−1	−3	−1	−2	−1	+1	0	−2	0	−1
7d	2b	9	1.89	2.2	2.67	5	2.1	+2	0	0	+1	0	+1	+1	−1	−1	0	−2
9a	2b	8	1.94	2.3	3.01	5	2.2	+1	0	0	0	0	0	+1	0	0	0	−1
9b	2b	7	1.83	2.2	2.64	15	2.1	+2	+2	0	+1	+1	+1	+1	+1	−1	0	0
9c	2b	1	1.91	2.4	2.93	3	2.1	−1	−2	−2	−2	−2	−1	+1	0	0	+1	−1
9d	2b	1	1.93	2.3	2.79	2	2.1	−1	−2	−2	−1	−2	−1	0	−1	−1	0	−1
9g	1b	1	1.91	2.3	2.93	4	2.1	−1	−2	0	−2	−2	−1	+1	0	+2	+1	−1
9h	2b	9	1.92	2.3	2.87	4	2.1	+1	0	0	0	0	+1	+1	0	0	+1	−1
13a1	1b/	0	1.79	1.9	2.41	20	1.9	−1	−1	−2	−1	−1	−1	0	0	−1	0	0
13a2	2b	10	1.91	2.4	2.88	8	2.2	+1	0	0	0	+1	0	+1	0	0	0	−1
13a3	2b	11	1.37	1.4	2.82	54	1.8	+3	+3	0	0	+3	+3	+3	+3	0	+3	0
13a4	2b	0	.67	.8	NA	NA	NA	0	0	−3	NA	NA	NA	NA	NA	NA	NA	0
13a5	1b	14	1.20	1.1	2.39	59	1.9	+3	+3	−2	+2	−3	−2	+1	+1	0	0	0
13a8	1b/	5	1.14	1.5	NA	NA	NA	+2	+2	+2	NA	NA	NA	NA	NA	NA	NA	0
13a9	2b/	1	1.46	1.5	NA	NA	NA	+1	+1	+1	NA	NA	NA	NA	NA	NA	NA	0
14a2	2b	4	1.64	1.8	2.14	84	1.9	+2	+2	−1	+2	+2	+1	0	0	−3	−1	0
14b2	2b	4	1.65	1.7	NA	NA	NA	+2	+2	−1	NA	NA	NA	NA	NA	NA	NA	0
14c2	1b	0	.95	.8	2.46	80	1.8	0	0	−1	−1	0	0	+1	+1	0	+1	0
14d2	1b	10	1.75	1.8	2.20	31	1.8	+3	+2	+2	+3	+3	+3	0	−1	−1	0	−1
15a1	2b	1	1.86	2.0	2.83	31	2.2	0	−1	−2	−2	+1	−2	+2	+1	0	0	−1
15a2	2b	1	1.88	1.8	2.86	30	2.1	+1	−2	−2	−2	+1	−1	+3	0	0	+1	−3
15b2	1b	2	1.94	2.1	2.89	22	2.2	+1	−1	+1	−1	+1	−1	+2	0	+2	0	−2
15b3	1b/	3	1.94	2.0	2.78	23	2.1	+1	−1	+2	0	+1	0	+1	−1	+2	0	−2
15c1	1b	0	1.94	2.1	2.93	24	2.1	−1	−3	−1	−3	−1	−2	+2	0	+2	+1	−2
15c2	1b	0	1.94	2.0	2.91	24	2.1	−1	−3	−1	−3	−1	−2	+2	0	+2	+1	−2
16a2	2b	8	1.21	1.3	2.17	70	1.8	+3	+3	0	+3	+3	+3	0	0	−3	0	0
16b2	2b	12	1.84	2.5	2.11	20	1.9	0	+2	0	+3	+2	+2	−3	−1	−3	−1	+2
16c2	2b	0	1.86	2.4	2.44	8	2.0	−2	−2	−3	−1	−2	−2	−1	−1	−2	−1	0
16d2	2b	4	1.85	2.3	2.50	12	1.8	0	0	−1	0	0	+2	0	0	−1	+2	0
16e2a	1b	1	1.23	1.3	1.89	75	1.7	+1	+1	0	+1	+1	+1	0	0	−1	0	0
17a2	2b	1	1.86	2.4	2.68	10	2.0	−2	−1	−2	−1	−1	−1	0	0	−1	0	0
17b2	2b	4	1.85	2.6	2.33	10	1.9	−1	0	−1	+2	0	+1	−3	−2	−3	−1	+1
17c2	2b	2	1.88	2.4	NA	NA	NA	0	−1	−1	NA	NA	NA	NA	NA	NA	NA	−1
17d2	2b	5	1.40	1.9	NA	NA	NA	+1	+2	−1	NA	NA	NA	NA	NA	NA	NA	+1
17e2a	2b	3	1.85	2.3	2.26	18	1.8	0	0	−1	+2	+1	+2	−2	−2	−3	0	0
17e2b	2b	2	1.81	2.2	2.46	13	1.8	+1	+1	−1	+1	0	+2	0	0	−2	+1	0
17f2a	2b	1	1.88	2.6	2.70	9	2.0	−2	−2	−2	−1	−1	−1	−1	−1	−1	0	0
17f2b	2b	1	1.74	2.3	2.66	23	1.9	−1	0	−2	−1	0	0	0	+1	−1	+1	+1
17f2c	2b	1	1.48	1.7	2.55	54	1.8	+1	+1	−2	−1	+1	+1	+2	+2	−1	+2	0
17f2d	2b	0	1.87	2.2	2.41	16	1.9	−1	−3	−3	−1	−1	−1	0	−2	−2	0	−2
17f2e	1b/	0	1.84	2.3	NA	NA	NA	−2	−1	0	NA	NA	NA	NA	NA	NA	NA	+1
17g2	1b/	0	1.64	2.2	NA	NA	NA	−1	0	0	NA	NA	NA	NA	NA	NA	NA	+1
17h2a	1b/	2	1.82	2.4	NA	NA	NA	0	+1	+2	NA	NA	NA	NA	NA	NA	NA	+1
17h2b	2b	2	1.86	2.2	2.38	17	1.8	+1	0	−1	+1	+1	+2	0	−1	−2	+1	−1
17i2	1b/	1	1.77	2.1	NA	NA	NA	0	0	+1	NA	NA	NA	NA	NA	NA	NA	0

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